THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. V. No. 85—7th YEAR.] LONDON, JANUARY 22, 1856. [Subscription per Ann. { 15s. in Advance / 18s. Credit.] Price 8d. Unstamped.

TO GAS COMPANIES.

BOGHEAD CANNEL COAL.—This is the most highly bituminous coal known, and, therefore, peculiarly adapted for mixing with inferior coals in the Manufacture of Gas, for which purpose it is exclusively used. One ton of it yields 15,486 cubic feet of gas, according to Dr. Fyfe's experiments, and in actual working the produce is at least 13,500 feet of the specific gravity of ·775; and a burner, consuming at the rate of 1 cubic foot per hour, gives a light equal to 8¼ spermaceti candles, each consuming 120 grains of sperm per hour. The light yielded by one ton of this coal is equal to that from 1990 lbs. of sperm candles; whereas that from the same quantity of Newcastle Caking Coal is only equal to 420 lbs.; and that from the best Wigan Cannel Coal is only 750 lbs. of sperm candles. It can be shipped at any of the ports in the Frith of Forth or the Clyde.

For terms and other particulars apply to

R. W. KENNARD and Co.,
Sole Agents,
67, Upper Thames-street, London.

TO IRONFOUNDERS AND GAS-WORK CONTRACTORS.

THE Directors of the Hastings and ST. LEONARD'S GAS COMPANY will meet at their offices in Hastings on Friday, the 15th of February next, to receive tenders for the supply and erection upon their works in Hastings of a CAST-IRON GAS-HOLDER TANK, 91 feet internal diameter, and 24 feet deep, with inlet and outlet pipes complete. The plans and specification may be seen at the office of Mr. T. G. BARLOW, 3, PARLIAMENT STREET, Westminster, the Company's Consulting Engineer, on and after the 28th instant, up to the 11th of February; and the tenders must be sent to or delivered at the office of W. B. YOUNG, Esq., the clerk of the company in Hastings, on or before 4 o'clock on Thursday, the 14th day of February next, endorsed, "Tender for cast-iron tank."

The Directors do not bind themselves to accept the lowest or any tender,

Hastings, Jan. 19, 1856.

TO GAS COMPANIES.

THE Advertiser, who has had 23 years' experience as FOREMAN in some of the largest Metropolitan Gas-works, and who is practically acquainted with the most approved systems of gas manufacture, desires a similar Situation in another first-class Gas-work, and would have no objection to go abroad. The highest testimonials can be given, and security, if required.—Address S. W., care of the Editor of this JOURNAL, 3, PARLIAMENT STREET, London.

EIGHTON MOOR GAS COALS.—Parties wishing to be supplied with these first-class Gas Coals will please to apply to Mr. MATTHEW NESBIT, EIGHTON MOOR OFFICE, NEWCASTLE-UPON-TYNE. These coals are well known as among the richest in gas, and working the roundest on the River Tyne. They are extensively used by metropolitan gas works.

COWEN'S PATENT FIRE CLAY RETORTS.

JOS. COWEN and CO.,

BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS RETORTS and OTHER OBJECTS in FIRE CLAY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire Clay Retorts in the United Kingdom; and orders for Fire Clay Retorts of all shapes and dimensions, Fire Bricks, and every other article in Fire Clay, are promptly executed at their works as above.

Also, owners of BLAYDON BURN COLLIERY, from which "COWEN'S CANNEL COAL," extensively used in Metropolitan and other Gas Works, and "COWEN'S GARESFIELD COAL," are obtained. From the latter, "COWEN'S GARESFIELD COKE" is made, the superior quality of which is well known.

Coal and Coke Office, Quay-side, NEWCASTLE-ON-TYNE.

JOHN RUSSELL AND CO.,

THE OLD TUBE WORKS,
CHURCH HILL, WEDNESBURY,
STAFFORDSHIRE,

and 69, UPPER THAMES STREET, LONDON,

Original Manufacturers of Wrought-Iron Gas Tubes, and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Boilers; have been awarded the FIRST PRIZE in the Great Exhibition of Paris for these Articles.

J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest Orders may be executed in a few days.

The eminent Mr. Perkins confines himself altogether to the use of John Russell and Co.'s Tubes in High-Pressure Patents.

Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanised Tubes, &c.

N.B. All Goods thoroughly Tested before sent out, and Warranted.

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MR. T. A. HEDLEY (A.I.C.E.), CONSULTING GAS ENGINEER, may be consulted upon all matters connected with the manufacture and distribution of gas. Plans, specification, and drawings supplied.—Offices, Warkworth, BANBURY.

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RAMSAY'S NEWCASTLE CANNEL was discovered by the Advertiser in 18 8. Cannel Coal was then little used in London: after surmounting much opposition, it has become the principal Cannel Coal used in the Metropolis, and has greatly assisted in improving the London gas. Its joint products of gas of high illuminating power, and coke of good quality, make it one of the most economical coals known. It is used by all the London Gas Companies, as well as by many Provincial and Foreign. The Crystal Palace was lighted from it in 1851, and the Post-office, Bank, and *Times* Office, are at present.

FIRE-CLAY RETORTS.

FIRE-BRICKS of all descriptions. Manufactory established in 1804.

RAMSAY'S GARESFIELD COAL and COKE.

Bone and Artificial Manures of all kinds.

Address G. H. RAMSAY, Offices, Broad-chare, Newcastle-on-Tyne.

April 27, 1854.

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THE Directors of the above Company are prepared to receive tenders from gas engineers willing to CONTRACT FOR THE MAKING OF GAS equal in illuminating power to that of the Imperial and the Central Consumers' Companies in London; the quantity to be determined by the consumption of the consumers.

The company will advance money on account, and the contractors will be required to adjust accounts half-yearly. Security to the extent of £1000 will be required for due fulfilment of contract.

The contract will be for two years certain, and so on, from year to year, until the expiration of one year's notice to determine such contract, to be given by either party.

The present annual make of gas exceeds 27,000,000 feet.

Communications to be addressed (sealed up), under cover, to JOSEPH GREEN BOURNE, Esq., the clerk of the Company, DUDLEY, on or before the 20th of February next.

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THE Directors require the services of a MANAGER of energy and ability for the above works. He must be well acquainted with the manufacture and distribution of gas, and must also be competent to undertake the management of all alterations and repairs at the works of the company, and possess a general knowledge of the construction of meters and gas-fittings.

A house will be provided for the manager on the works.

Applications, stating the age of the applicant, former employment, full particulars of qualification, and the amount of salary required, to be addressed to the DIRECTORS at STOKE-UPON-TRENT, on or before the 21st day of January.

JAMES RUSSELL AND SONS,

WEDNESBURY, STAFFORDSHIRE, and 81, UPPER GROUND STREET, BLACKFRIARS, LONDON,

PATENTEES, INVENTORS, AND FIRST MAKERS OF

WROUGHT-IRON GAS TUBING,

commencing from the *earliest* introduction of Gas Lighting into this country.

Manufacturers of every size and description of Wrought-iron Tubes and Fittings, from one-eighth up to seven-inch internal diameter, for Gas, Steam, or Water.

PATENTEES AND MANUFACTURERS OF THE

LAP-WELDED FLUES,

for Marine, Locomotive, and Stationary Boilers.

Inventors and Manufacturers of

IMPROVED STEAM AND GAS COCKS,

in Iron or Gun Metal, from three-eighths to six-inch bore. Manufacturers of every description of hand-screwing

STOCKS, DIES, AND TAPS,

for Gasfitters and Engineering purposes.

Manufacturers of Coils, for hot water and other purposes; Casing of all sizes, with flush joints, for Well-sinkers; Blasting Tubes; Buffer Tubes for Railway Carriages; Tubes for Roller Beams; Spindles, Shafts, Pendulums, Hydraulic Presses, Core Bars, Steam Gauges, &c. &c.

JAMES RUSSELL and SONS beg to call the attention of Engineers, Builders, Water Companies, and others, to their

PATENT ENAMELLED TUBES,

which preserve water or other liquids conveyed by them in a perfectly limpid condition; whilst the Enamel itself is as pure as the finest Porcelain, possessing the rare recommendation of being entirely free from any noxious ingredient in its composition.

Lists, Estimates, &c. &c., forwarded on application; orders, from 10 to 100,000 feet of gas tube, executed at twelve hours' notice if required; and quality may be safely relied upon, as all goods are most carefully tested before leaving the Works.

JAMES RUSSELL and SONS have great pleasure in calling attention to the annexed award:—

"EXHIBITION OF THE INDUSTRY OF ALL NATIONS, NEW YORK.

"Office: No. 6, Charing-cross, London, April 6, 1854.

"Gentlemen,—I have much pleasure in informing you that the Jury has awarded to your firm 'HONOURABLE MENTION FOR LAP-WELDED IRON TUBES.' You are at full liberty, if you deem it likely to promote your mercantile advantage, to affix to these articles, during the season 1854, a card whereon this Award is printed, and also your prices, with name of agent, &c.—I am, gentlemen, your obedient servant,

"JOHN H. BOHN, Secretary."

"Messrs. JAMES RUSSELL and SONS, Wednesbury, STAFFORDSHIRE."

JOURNAL OF GAS LIGHTING NEWSPAPER PENNY

LESMAHAGO GAS COAL.

JAMES FERGUSON and CO., Lessees of the Auchinheath and Craignethan Gas Coal-fields (the most extensive and valuable in the parish of Lesmahago), respectfully intimates to the Managers of Gas Works and Consumers of Gas Coal, that he is prepared to ship the best quality of the above well-known COALS at Glasgow or Leith; and also to deliver them at the railway stations upon, or connected with, the Caledonian Railway, to any extent which may be required.

Price, free on board, or delivered at the railway stations, may be learned by addressing James Ferguson and Co., Gas Coal Works, Lesmahago; or J. H. Jones, 1, Poets'-corner, Westminster, sole Agent for London.

JAMES FEATHERSTONE,
ENGINEER,
Manufacturer of GASHOLDERS, IRON ROOFS, and every description of Gas Apparatus.
ALLIANCE IRON WORKS,
CLAYTON, near MANCHESTER.

GREAT EXHIBITION PRIZE MEDAL,
AND CERTIFICATE FOR GAS METERS,
CLASS XXII., No. 424.

PADDON AND FORD,
PATENT GAS METER & APPARATUS WORKS,
GRAY'S-INN-ROAD, LONDON,
Manufacturers of WET and DRY GAS METERS, STATION METERS, GOVERNORS, EXPERIMENTAL APPARATUS, GAS STOVES, LANTERNS, Iron Barrel and Fittings, Main Cocks, &c. &c.

Contractors for the erection or alteration of Gas Works; and every description of Apparatus required in Gas Works supplied. Competent men sent into the Country, and References given to work done.

PADDON and FORD are enabled, from the successful character of their workmanship and material, to guarantee the accuracy and durability of their meters, either WET or DRY, for a stated period.

TO GAS COMPANIES.

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Having applications for New and Second-hand Gas Apparatus, would be obliged by those Companies having Apparatus to dispose of, to send particulars. And Companies requiring Apparatus are solicited to apply.
PIPES, RETORTS, TANKS, GASHOLDERS, &c. on Shortest Notice.
STOURBRIDGE and NEWCASTLE FIRE GOODS.
CONTRACTS TAKEN.

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GASHOLDER MAKERS,
No. 8, WENLOCK-ROAD, CITY-ROAD,
LONDON.
Contracts for Tanks, Gasholders, Roofs, Purifiers, and all descriptions of Gas Apparatus executed on the most reasonable terms. Improved Slide Valves, Steam, and Range Boilers, and Smiths' Work, of the best materials and workmanship.

TO GAS COMPANIES.

THE BRYMBO COMPANY,
NEAR WREXHAM,
Manufacture Cold Blast Retorts and Pipes of a very superior quality, and also ship good Gas and Steam Coals at Saltney, on the River Dee, and at Birkenhead.
Brymbo Iron Works and Colliery, North Wales.
London agent, Mr. J. W. Grazebrook, 75, Old Broad-street.

WHITWELL PRIMROSE GAS COAL.—These excellent Gas Coals are wrought from the HUTTON SEAM *only*, and can be shipped either at the South Dock, SUNDERLAND; or Old Harbour, HARTLEPOOL; or Brandling Drops, SOUTH SHIELDS; on application to the WHITWELL COAL COMPANY, Sunderland.

PATENT FIRE-CLAY RETORTS.—O. BROTHERS and COMPANY, Manufacturers of O. Brothers's Patent, beg to state that these Retorts, being made in one entire operation, and in one piece, of any required shape, length, breadth, and height, are not liable to cracks and fissures, of which there is a just and general complaint; and consequently superior to, and cheaper than, any hitherto manufactured.

GREAT REDUCTION IN PRICES—30 per cent. cheaper than any other Clay Retorts manufactured.

Shape.	Sizes.	Length.	Thickness.	Price at Railway Station, Blackburn.	Price per foot run, of any required length, at Blackburn.
		feet.	in.	£ s. d.	s. d.
Dee.....	12 in. by 12 in.	8	2½	2 0 0	5 0
,, ...	14 in. by 12 in.	8	2½	2 4 0	5 6
,, ...	16 in. by 13 in.	8	2½	2 10 0	6 3
,, ...	18 in. by 14 in.	8	2½	2 16 0	7 0
,, ...	19 in. by 13 in.	8	2½	2 16 0	7 0
,, ...	20 in. by 14 in.	9	3¼	3 7 6	7 6
,, ...	24 in. by 15 in.	8	2½	3 12 0	9 0
Round.....	15 in. by 15 in.	8	2½	2 10 0	6 3
,, ...	15 in. by 15 in.	10	2½	3 2 6	6 3
,, ...	18 in. by 18 in.	8	2½	3 0 0	7 6
Oval Retort	18 in. by 12 in.	8	2½	3 0 0	7 6

All other sizes and shapes in proportion, to order.
References and further particulars may be obtained on application to the Patentee, Gas Works, BLACKBURN.

F. & C. OSLER,
44, OXFORD-STREET, LONDON;
Manufactory—Broad-street, Birmingham,
MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.
ELEGANT CRYSTAL GLASS CHANDELIERS, FOR GAS
(Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. The more extensive use of Gas in private dwellings has induced Messrs. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.
THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE ON THE LOWEST TERMS.

RUTTER ON GAS LIGHTING.
Hundred and Twenty-eighth Thousand.
ADVANTAGES
OF
GAS IN PRIVATE HOUSES.
BY J. O. N. RUTTER, F.R.A.S.
A New Edition, Revised in 1855.
Price:—Per 1000 copies, £5; 500 ditto, £2. 15s.; any smaller number, 12s. per 100.

Twenty-sixth Thousand.
GAS IN DWELLING-HOUSES:
ITS USES, CONVENIENCES, AND ECONOMY.
Price:—1000 copies, £3. 3s.; 500 ditto, £1. 15s.; any smaller number, 7s. 6d. per 100.

A single copy of either of the above-mentioned books will be sent, on application to the Author ONLY, by payment of the postage (2d.).

These little books are written in a simple and familiar style; showing the comfort, convenience, safety, and economy of Gas. They are intended for gratuitous distribution by Gas Companies. They have already done good service, and the author is anxious still further to extend their usefulness.

The present high prices of tallow and oil are favourable to a more general adoption of gas in private houses. Let its advantages, as yielding a pure, cheap, and healthful light, be properly explained, and there will be no difficulty in getting over a few old-fashioned prejudices. Those persons who have experienced the benfits of gas-light never go back to candles or lamps.

JOHN W. PARKER AND SON,
WEST STRAND, LONDON.
Black Rock, Brighton.

12,950 CUBIC FEET OF GAS,
Specific Gravity ·820, produced from a ton of BATHVILLE CANNEL COAL, a Coal identical with that named Bathgate, Boghead and Torbane Mineral.

JAMES LAWRIE and CO.
COUSIN LANE, UPPER THAMES STREET,
SOLE AGENTS.
Messrs. LAWRIE and Co. are also Sole Agents for the excellent KNIGHTSWOOD CANNEL, used by London Companies, and are Makers of RETORTS, Clay and Iron; SOCKET PIPES; and all kinds of CASTINGS.

SHEARS AND SONS'
PATENT DRY GAS METERS
Are supplied to Gas Companies and the Public as the best and simplest Dry Gas Meters in use. They are acknowledged to be of first-rate workmanship and accuracy of registration.—Shears and Sons continue to supply these Meters on the most favourable terms; and they also manufacture Wet Gas Meters, to which they apply their Patent Indices.
BANKSIDE, LONDON.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

WHITEHOUSE and CO.,
GLOBE PATENT TUBE WORKS,
WEDNESBURY,
Beg to draw the attention of Engineers and Managers of Gas Works to the superior quality of the Article they manufacture, both in respect of the iron employed, and the perfect manner in which it is welded; in proof of which they can refer to the testimonials of the most eminent Gas Engineers, and the experience of the principal of the large Gas Companies of the kingdom.
Orders promptly executed.

IMPROVED
SELF-LUBRICATING GAS VALVES,
Used in nearly one hundred gas works in Great Britain and the Continent, and are esteemed for their strength, superior workmanship, non-liability to damage, never sticking, oiling themselves, always working free in tar, lime, or gas, never falling down, and their very legible index of opening of valve—advantages only possessed by these valves.

SELF-REGISTERING GAUGE COLUMN
To regulate the pressure in the Street Mains, showing at one glance the valve on the facing, area of the opening, size of pipe the gas passing will fill, and the pressure on the works and on the mains. This supersedes the necessity of the expense of a governor for small works, and should be placed on the by-pass, where a governor is used in large works. IT IS NEXT TO IMPOSSIBLE FOR THE VALVE MAN TO PUT A TOWN IN DARKNESS WITH THIS APPARATUS, and is a great ornament to the Valve-room.

IMPROVED ANNULAR CONDENSER.
Ensures perfect condensation with smallest weight of iron, and standing on the smallest space, the whole of the parts being instantly accessible. They are in use in various Gas Works, small and large, and passing 20,000 to 600,000 cubic feet per 24 hours.

DRY LIME AND OXIDE OF IRON PURIFIERS.
Perfect simplicity of action and improved Sieves, which are strong and very lasting, and the wires, when worn out, may be replaced in an hour and a half by any handy man in a gas work. The undersigned have made them, and have patterns for every size from 3 feet to 18 feet square.

GASHOLDERS, SCRUBBERS, &c.
CHARLES WALKER AND SONS,
LITTLE SUTTON-STREET, LONDON, AND MIDLAND IRON WORKS, TIPTON, STAFFORDSHIRE.
Applications for Prices, &c., to be addressed to their London Office, as above.

PATENT FLEXIBLE GAS TUBING.
JAMES LYNE HANCOCK'S
Vulcanized Indiarubber Hose Pipes and Tubing. Manufactory (and Warehouse), Goswell-mews, Goswell-road, London.

Gas Companies, Engineers, Gas Fitters, and the Trade generally, are respectfully informed this Tubing is now manufactured to any size, from ¼ inch bore and upwards, in 100-feet lengths, and perfectly cylindrical, either with or without a spiral wire inside.

VULCANIZED GLAZED FLEXIBLE TUBING, from ¼ inch up to 1 inch diameter, made in 24-feet lengths; or, covered with silk or worsted, up to 100 feet.

VULCANIZED HOSE, for FIRE ENGINES, BREWERS' USE, and for standing great pressures, (Rubber and Cloth combined), made to any length or size to fit the necessary screws, &c.

VULCANIZED INDIARUBBER AIR-TIGHT BAGS, made any size, for Gas Mains, with flexible tubes attached, and fitted with stopcocks complete.

CARTER'S PATENT SAFETY GAS VALVES.
THOMAS LAMBERT and SON,
PATENTEES AND MANUFACTURERS,
SHORT STREET, NEW CUT, BLACKFRIARS, LONDON.
The Bank of England is fitted entirely with these Valves, from the smallest branch to the largest main pipe.

The following, among numerous testimonials, will be found very satisfactory:—

"The British Gaslight Company's Office, No. 105, Broad-street, Ratcliff, London, June 10, 1846.

"Gentlemen,—In reply to your inquiry, I have to state that 'Carter's Patent Gas Valve' has been used by this company and by the fitters of the district extensively for seven years past. It was adopted to obviate the inconvenience of setting fast, so prevalent with the conical metal plug-cocks, and has been found to answer the purpose intended.

"I have recommended its use in several provincial towns with which I am professionally connected, and have not received any complaint of its having failed in any respect of performing satisfactorily all that is required of it.—I am, gentlemen, yours respectfully,
"GEDDIE PEARSE.

"Messrs. Lambert and Son, Lambeth."

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TO CORRESPONDENTS.

D. G., Edinburgh.—*We are obliged for your useful hint, and have availed ourselves of it in our present issue.*

W. M., Tyldesley.—*A landlord can sell a meter let out by a gas company on hire, for arrears of rent due to him, unless the company is incorporated by act of Parliament, and their property specially protected from seizure for rent.*

A Novice *inquires where Messrs. Markham and Reeves, the eminent engineers who are stated to have valued the Deptford Gas Works at £12,000, gained their experience? We have been unsuccessful in our endeavours to answer the inquiry; but it has been suggested to us that one of them may be a descendant of glorious Jack Reeves, of Adelphi memory. The printer's devil says their reader has requested that for the future some one may be sent from the editor's Basinghall Street office to correct the proof.*

Bombastes Furioso.—*A garbled extract of our report of the last meeting of the City of London Gas Company will, no doubt, be published by a contemporary as the "exclusive" report promised to its readers on the 1st of next month; another instance of the fate which attends those who "count their chickens ere they're hatched."*

NOTICES.

Several complaints have reached us of copies of the last number, purchased at 88, Cheapside, having been charged more than 8d., in consequence of a misconception on the part of Mr. Hebert. The overcharge will be refunded by him on application.

The next number will be published on Tuesday, Feb. 5, and the subsequent numbers on each successive alternate Tuesday, till our project of weekly publication is carried into effect.

Stamped copies, when forwarded by post, must be folded so as to expose the stamp; they are otherwise liable to the full postage charge for letters.

This Journal has been duly registered at the General Post Office for transmission abroad.

Communications and orders for Advertisements to be addressed to the Editor, No. 3, Parliament Street, Westminster.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 22, 1856.

THE LIVERPOOL CORPORATION AND THE GAS COMPANY OF THAT TOWN.

It will be seen from the report of the proceedings at the special meeting of the Town Council of Liverpool, held on the 9th instant, that the resolutions proposed by the select committee upon the supply of gas were carried by a small majority. These resolutions involve the consideration of financial operations of great extent, and with which it is essential that both the ratepayers of Liverpool, the gas consumers, and the shareholders of the company should be made acquainted. They do not appear to have been properly explained at the time of meeting, and therefore we feel that it is our duty to recall public attention to their nature, and their ultimate bearing upon the various classes interested.

The proposition which is of the most importance is contained in the first resolution, to this effect, "that the share property of the company be converted into bonds of the company, bearing a fair and equitable rate of interest; and that the undertaking be managed by a board of directors, three of whom shall be appointed by the council, three by the consumers of gas, and three by the bondholders."

Substantially this proposition amounts, in its present form, and as explained by its advocate, Mr. Kitchen, simply to the confiscation of the share property of the company; and it is almost impossible to believe that it should have been made by any man of business in good faith. It must evidently be absurd to suppose that the shareholders should consent to abandon the nomination of two-thirds of their directors to parties whose interest it manifestly must be to depreciate their property, whilst no other security than their own property is offered to them. They actually possess the guarantee which it is proposed to give them, that the interest to be settled between them and the town council shall be paid; and, moreover, they are now entitled to obtain a profit from their existing capital, and by the exercise of their actual rights, which may be even in excess of the probable rate of interest. In any bargain it is equitably supposed that there should be mutual advantage, yet in this case there is only contemplated by the select committee what Daniel O'Connell called "a one-sided reciprocity." The shareholders are to give up their undisputed property, and in exchange they are to receive a species of mortgage upon it; they are to give up the right of electing their own servants and guardians, and are to hand themselves over to the tender mercies of those who have a direct interest in diminishing the sum to be paid to them. Really the proposition is so monstrous that it is inconceivable that a man of common sense could make it; still more strange is it that an assemblage of Englishmen should have committed themselves to its support. *Risu solvuntur tabulæ.* The meeting ought to have laughed such nonsense to scorn.

If the Town Council of Liverpool desire to obtain possession of the gas-works without disbursing the ready money necessary to purchase them, the course of converting the share capital into bonds of the corporation is a very straightforward and intelligible one. The amount to be paid for the works and property of the company would then become a question of bargain and sale, the bonds simply representing money, and bearing only their current value in the market. Any other mode of transferring the property of the shareholders to the town council and the gas consumers—such as is proposed to be effected by withdrawing from the gas-makers the management of their operations—is, as we said before, simply a disguised measure of spoliation. Mr. Kitchen would have shown himself to have been a fairer and more business-like man, therefore, had he substituted the words, "bonds of the corporation," for those of "bonds of the company," as they appear in his resolution. With the present tendencies of the inhabitants of the north of England, we believe that eventually the Town Council of Liverpool will become gas manufacturers for the community they represent. We believe that such a course, inevitable though it be, will still be a very dangerous and impolitic one. Our society is fast approaching the state of some of the ancient republics of Greece and of Rome, in which it was necessary to flatter the passions of the mob to be allowed to exercise scientific or administrative functions. We are passing under the rule of demagogues who advance their own interests at the expense of the masses they deceive, whilst they pretend only to be anxious to defend public interests. This tendency is apparent, unfortunately, in London as well as in Liverpool—to some extent in the south as much as in the north of England; but it may seriously be questioned whether such monstrously absurd propositions as those made by Mr. Kitchen would have been listened to patiently elsewhere than in the commercial capital of the north.

To the inhabitants of Liverpool we would simply say, that if the new gas estate, as proposed to be formed, be managed as injuriously to their interests as the dock estate has been they will find that their position will not be changed for the

better by the substitution of services devoid of the spur of private interest for those stimulated by the prospect of an increased remuneration, in proportion to the skill and energy employed. As we said before, it is a law of nature that men will not work for a continuance with zeal and earnestness, unless they know that their reward will increase with the attention they bestow upon the discharge of their duties. Corporation works are usually better managed than Government works because the superintendence and the responsibility are more direct and immediate; but, by the same rule, corporation works are worse managed than those of private parties. The Liverpool ratepayers need only examine what is passing at Manchester to form an opinion of the results of taking the manufacture of gas into their own hands. What would be the result if, as Mr. Alderman Bennett very properly suggested, a new mode of lighting able to supersede gas were discovered?

But, quitting the commercial for the scientific branch of the discussion, we find common sense and honesty more outraged still. Physicians tell us that no diseases are so difficult to cure as those of the imagination; and the same circumstance seems to hold good with respect to troubles of a more material character. An elderly maiden lady, who has spent some forty years of her life in sipping *bohea* and digesting scandal, will, now and then, take it into her head to fancy herself a "teapot," and insist upon sitting all day with her arms "a kimbo"—fashioning the spout and handle of the apparatus in question. Her astonished friends send for the doctor, and, like Macbeth, demand some "medicine for a mind diseased;" but the learned man shakes his *cerebellum*, and merely orders the removal of all instruments by aid of which his patient could hurt herself; the rest he leaves "to time and healing nature." Just so we sometimes find individuals in the material world, who, having gone on for years with less than their average of troubles, suddenly conceive themselves the martyrs of perfidy, and begin to howl and roar with all the energy of men keenly suffering from the most oppressive tyranny. To reason with them is vain—to argue, simply ridiculous; they must howl, and they will howl, in exact imitation of the real object of their hallucination; like the old lady, they will sit "*à la* teapot," and, like her, they must be left to the operation of time, in a place of safety.

A portion of the town council is now an example of the latter description of frenzy, and raves in furious agony at the phantom of its own imagination, which is not a "teapot" but a "gas-meter." The natives of Owyhee, when they first saw a watch, declared it to be "a god;" Mr. Kitchen and others, of the town council, who have served a seven days' apprenticeship to the City of London meter-prover, have, on the same principle, come to the conclusion that a gas-meter is a kind of devil. What can be done to remedy so distressing a mania? We fear there is nothing for it but to follow the usual practice in such cases, and remove, if possible, all dangerous instruments from the hands of the patient. We might, indeed, explain the construction and mode of action of the gas-meter—but what then? As well might Captain Cook have explained the arrangements of a watch to an Owyhee sage: the original impression is too strongly engraven to be eradicated by reason; and time alone can work a cure.

But the removal of obnoxious implements is perhaps more easily achieved, and in this particular we will do our duty. In another column will be found a voluminous report of proceedings which embody in themselves two of those kind of explanatory letters commonly written by persons who have already explained too much. "He," says Montaigne, "who wishes to conceal an error, generally tries to hide it beneath a multitude of words," and Messrs. Clegg and Taunton are no exceptions to this rule. We will not attempt to thread the verbose labyrinth of their respective "explanations," but come at once to the sore point. Mr. Clegg has raised a huge cloud of mathematical dust to prove, in other words, that from an opening of a given size a pint pot can be sooner filled with water than with treacle; but all Mr. Clegg's dust cannot prevent the public from seeing that, when the pint pot is filled, whether with water or treacle, it measures exactly a pint of the respective fluids, neither more nor less. Discarding, therefore, the "diligent investigations of Mr. Hawkesley, Mr. Wm. Pole, M. Girrard, and my son," it is quite certain, when Mr. Clegg states that gas of a low specific gravity propels a meter faster than gas of a high specific gravity, he states that which is false, and which Mr. King, and every other man of ordinary scientific acquirements, can and will regard as ignorant nonsense; nor will either Newton, Hutton, Gregory, Robison, Dubuat, Bossut, Bernouilli, Etelwein, or others, however numerous, help Mr. Clegg out of the absurdity of his position. It is, indeed, painful to notice the shallow artifice with which Mr. Clegg seeks to gloss over his original error, by mixing it up with the questions of "light" and the "co-efficient of friction;" the real subject for consideration has nothing at all to do with these matters, it is as plain and simple as "a pike-staff." Can Mr. Clegg prove that a meter which correctly indicates the amount of hydrogen gas passed through, will not correctly register the passage of oxygen? This is the Q.E.D. of his dispute with Mr. King, and no exercise of sophistical ingenuity can enable him to escape from the conclusion.

Having done with "leviathan" we now come to the "minnow" of the story. And what shall we do with this shrimp! Let him go, poor fellow! or rather let him speak for himself. He says:--

"But I will give you one other proof of the accuracy of my testings, and conclude. The editor of the JOURNAL OF GAS LIGHTING (a paper that has from the first espoused the cause of the Liverpool Gas Company) asked for and obtained from the meter-tester for the district south of London a table of testings from June to September 29, 1855, to be published in that paper on the 10th of December last, when the editor in question found that they fully established the accuracy of the Liverpool testings, only a garbled report appeared in that paper, but which was given entire in the *Gas and Water Times* of the 15th of that month."

The proofs of his accurate testing depend, then, upon this paragraph, in which there are no less than two distinct lies! In the first place, we never "asked for" anything with the condition "to publish it;" and, in the second place, we *did* publish *all* that we asked for exactly as it was sent to us: to have published anything else would have been not only to have published "a garbled report" of our inquiries, but one for which, no doubt, "a notice of action" was lying "ready cut and dry." That Mr. Taunton's *testings* are as accurate as his *statements* we can easily believe, but this is not saying much in their favour; and, if further evidence is needed of their utter worthlessness, we refer the reader to Mr. Edwards' crushing exposure, which appears in another column of our present issue, of Mr. Taunton's unfitness for the task he undertook.

THE METROPOLITAN BOARD OF WORKS.

SEVERAL meetings of this body—which must eventually become the municipal council of the metropolis, like its prototype of Paris—have already taken place, and the proceedings have been watched with great interest by the public. Hitherto the business transacted must be considered to have been confined to the internal organisation of their own proceedings, and to the nomination of their principal officers; together with the adoption of the transitory measures for the protection of the property and interests intrusted to the new Metropolitan Board. At present little has taken place to indicate the probable prevailing tone or opinions of this important governing body; but it must be universally admitted that hitherto the proceedings have been characterised by a degree of order, good feeling, honesty of purpose on the part of the majority, and of common sense, which must be highly satisfactory to those who argue well for the working of the system of local self-government, and who believe that the sound principles which prevail amongst the British public will eventually correct the wilful or involuntary blunders of the central government. In the main, our fellow-countrymen do best when left to take care of themselves; our Government, especially of late years, almost always fails when it attempts to meddle with the affairs of every-day life. There seems every probability, if we may safely judge by the short tenure of office of the new Metropolitan Board, that another illustration of this fact will be presented by it; and that the unsatisfactory proceedings of the numerous recent Royal Commissions of Sewers will be avoided under the Metropolitan Board of Works lately assembled.

The result of the election of chairman took the public rather by surprise; and we confess that, considering the very active and prominent part he took in the proceedings of the last Commission of Sewers, we ourselves felt a degree of regret that a gentleman who had so far committed himself t· the factious opposition and the ridiculons nonsense of Mr. F. O. Ward, should have been selected for so influential a position. His conduct in the chair has, however, raised Mr. Thwaites very much in public estimation; and hitherto he has behaved, on the whole, with a degree of impartiality and dignity which was hardly expected; whilst his known tact and business habits

have been found of very great value. We modify what otherwise would have been unmitigated praise, because the personal impression produced upon us by Mr. Thwaites' attempt to suppress Mr. Alexander Wright's very proper resolution, "That no member of the board should be allowed to become a candidate for a paid situation under it," and his allowing Mr. Wilkinson to parade his intimate connection and confidential relations with the chairman as one of his principal recommendations, appeared to prove that he (Mr. Thwaites) was not impartial in the election of the clerk. We hope that we are in error in thus suspecting the purity of his official conduct; in all other matters we repeat that Mr. Thwaites has proved himself worthy of the position to which he has been elected; and he has managed—aided, it is true, by the good sense of the other members of the board—to give a tone of business-like regularity and of dignity to their proceedings, from which the members of the St. Stephen's Bear Garden would do well to take a lesson.

It will be a subject of congratulation to those who have followed the history of the recent attempts to improve the sewerage of our metropolis, that Mr. Woolrych should have been elected to the responsible office of clerk to the new board. His choice, on the grounds of his practical acquaintance with all the working of the late commissions, of his intimate acquaintance with the legal duties of his old and new situations, and of his long experience in public business, proves that the members of the new board have paid due attention to the selection of perhaps their most influential officer. The only subject of regret that we feel with respect to this election is, that Mr. Thwaites should not have repudiated any connection with the disgraceful attempt to raise a prejudice against Mr. Woolrych, which is known to have proceeded from one of his former colleagues and present intimate friends. We will not stop to stigmatise as they deserve the attempts of the writer in the *Morning Post* and the *Observer*, evidently one and the same individual, to sow dissention in the board by attempting to fix party names, and to circulate partial accusations long since refuted; but we would suggest to Mr. Thwaites that he would rise still more in public estimation than he has already done, if he were openly to deny his connection with the anonymous slander of an old and faithful public servant. Mr. F. O. Ward boldly assumed the paternity of the nicknames of the "turnip test," "self-cleansing pipe sewers," "combined back drainage," &c., &c., ridiculous or ungrammatical as they may be. Why does not the author of the attempted nickname of the "City party" avow that interesting bantling? Under any circumstances we object to nicknames; they are poor substitutes for argument; but when they are introduced for the purpose of serving a private interest, or of throwing dissention into a newly organised public body, we hold them to be positively culpable. Mr. Thwaites will gain nothing by allowing his friends to pursue so undignified a course. Like Cæsar's wife, he must now be above suspicion; and if he cannot inspire discretion amongst his followers, he would do wisely to cast them aside. In the meantime, the election of Mr. Woolrych proves that the new Metropolitan Board know how to put "the right man in the right place." Much of the credit of this election appears to be due to the adoption of Mr. Wright's motion, before alluded to; and the public owe him a debt of gratitude for his perseverance in carrying it, even against the manifest wishes of the chairman. Mr. Wright said very truly, that it was the first duty of the members of the board to keep themselves above even the suspicion of jobbery, which would infallibly have attached to them had one of their own colleagues been elected to a highly paid office under them.

Major Lyons' motion with respect to the width of streets, alleys, &c., is too much in accordance with the opinions we have expressed in another part of this JOURNAL for us to do otherwise than record our approval of the principles upon which it was based. We question, however, the propriety of affirming any such principles by a general resolution of the board, without, at least, endeavouring to connect them with a properly organised system of regulations, dealing with nearly all the conditions of the distribution of a town. These are matters which, we believe, it would be better to leave to the consideration of a sub-committee specially appointed to investigate all the bearings of the complicated questions connected with them;—general resolutions are not usually adopted after sufficient examination; nor can large bodies of men properly discuss matters of detail. If every member of the board, therefore, should, like Major Lyons, indulge in his crotchets, and persuade his colleagues to affirm them, as was done in his case, the public is likely to find itself subject to a strangely heterogeneous and contradictory series of regulations—an evil which it would be easy to avoid by referring all such matters to properly constituted committees, or to the responsible advisers of the board.

On the whole, then, we hail with satisfaction, and confidence in the future, the proceedings of the Metropolitan Board of Works, and recommend our readers to peruse carefully the record of their proceedings in another portion of our JOURNAL. There does, at length, appear a chance of escaping from the mischievous intermeddling of Home Secretaries or of Presidents of Boards of Health.

Since the preceding portion of this article was in type, we have read, with unfeigned regret, two very extraordinary notices upon the forthcoming election of engineer to the board in the *Observer*, a journal which is known to be the organ of a certain section of sanitary reformers. We hope most sincerely that Mr. Thwaites is no party to this indecent attempt to bully and intimidate the members of the board in their choice of the parties whom they may employ. Mr. Thwaites, when he took office, distinctly said that he would act impartially on all occasions, and carry out, without reservation, the decisions of the majority. It cannot be supposed that he knows much of engineering, nor has he yet irretrievably committed himself to any opinions with respect to it; and therefore we hold it to be as insolent as it is indecent on the part of his supposed or self-entitled friends to say that, if a particular candidate for the office of engineer be not elected, he must resign. Should he himself, however, be so ill advised as to commit himself to such a course, we could only say that the Metropolitan Board would gain by his withdrawal; because, irrespective of the merits of the two most prominent candidates for the position of engineer, it is ridiculous to suppose that the opinions of one man, upon a subject for which he has not qualified himself to judge by a previous education, should be allowed to override those of his colleagues, many of whom have had opportunities of studying the scientific questions so totally beyond the sphere of his antecedents. The members of the board need not, however, apprehend that, in exercising their own discretion in the choice of their engineer, they will loose the valuable services of Mr. Thwaites. We do not believe that he can have been a party to the indecent articles we allude to; nor do we believe that he would, for the mere sake of pleasing any literary adventurers, who are more ignorant than he is of the subjects upon which they attempt to dogmatise, abandon the lucrative and honourable position he has recently attained.

We had intended to have observed the strictest neutrality in this election, and to have avoided even the appearance of desiring to favour any of the candidates; but the ill-judged and unfair attempts to extol Mr. Rawlinson at the expense of Mr. Bazalgette, compel us to call attention to the facts, that Mr. Rawlinson was only engaged under Mr. R. Stephenson as foreman or inspector of masons; that, in the case of the St. George's Hall, Liverpool, he was only engaged to execute the hollow brick ceiling; and that, so far is it from being true that his operations under the exploded system of the old General Board of Health have been uniformly successful, that we recommend members of the Metropolitan Board who are anxious to learn the real truth, either as to his merits as an engineer, or to the merits of the small-pipe sewers, to examine for themselves the state of the works at Hitchin, or any other town where he has been employed. Mr. Rawlinson may well say, "Save me from my friends." We entertain serious doubts as to his qualifications to fill the office for which he has very injudiciously been proposed; but we are certain that he is too honourable a man to countenance the unworthy attempts made to secure his election, and that he will be the first to regret and repudiate such manœuvres.

ON THE APPLICATION OF THE MECHANICAL MEANS OF ENGINEERING SCIENCE TO SANITARY IMPROVEMENT.

[SECOND ARTICLE.]

THE opinions at present held with respect to the influence of the paving of a town upon the health of its inhabitants is another illustration of the practical neglect with which abstract theorists treat questions of the greatest importance, when these latter do not appear to have any direct influence upon the suc-

cess of their favourite notions. There are hardly any allusions to this branch of the municipal duties, in recent publications, by the amateur school of engineers; yet it must be evident to all who have been brought into direct contact with the dwellings of the poorest and most closely-packed seats of population, that the state of the exposed surfaces of the roads, passages, courts, and yards, must have a very decided influence upon the sanitary condition of the neighbourhood. Hitherto the various authorities entrusted with the superintendence of the paving of London have devoted their attention almost exclusively to the streets through which the greatest traffic takes place; the back streets, as they are called, have been left to take care of themselves, and have been shamefully neglected, so far as the paving and cleansing have been concerned. It is to be hoped that the new municipal organisation will secure greater attention to the wants of the poor, in these matters, than was granted by the various parish vestries under the former system.

So far as the court-yards and general passages upon private property are concerned, it is hard to define the extent of interference which public authorities should exercise as to their execution and maintenance. We are decidedly and conscientiously of opinion that there is danger in substituting the action of public authorities for that of private individuals in cases where it is possible to retain the latter, even under theoretically imperfect conditions. Independence of thought and acsion—the power of thinking and acting for themselves—are, we believe, moral advantages so essential to the well-being of the poor, that we believe any immediate improvement of their sanitary condition would be dearly purchased by the introduction of a system which should render it unnecessary for them to exert themselves to secure their own comfort. It appears, therefore, to us that society can only so far interfere in this practical detail of sanitary science as to endeavour to inculcate the advantages of cleanliness—to educate the masses in this respect. By maintaining the surfaces of the roads, &c., under its own control in a proper state, the municipal authority would effect a direct good, in which all society would participate: indirectly, it would also effect good by setting an example, such as would infallibly lead to improvement in the habits and modes of life of those with whom it would otherwise be inexpedient to interfere. It is the duty of professional men who have to deal with house-property, moreover, to call the attention of their clients to the necessity for rendering the surface of the ground near dwellings as impermeable as possible, and to secure a ready discharge for all rain or house-waters. If these be retained, they give rise to emanations of the most dangerous character; and so long as the dwellings of the bulk of our population are exposed to this and other daily or permanent sources of insalubrity, it is in vain to expect a diminution of the average rate of mortality by improvements in the sewerage and water supply. "Healthy homes for the poor" would be one of the best watchwords of sanitary reformers: the proprietors of the houses now inhabited by the working classes ought to feel that it is their duty to do all that is in their power to advance so worthy an object.

Whatever opinions may be held with respect to the advisability of municipal or public control over the details of house construction, there can be no doubt but that the state of the public ways is the proper sphere for the efficient action of municipal authorities. In towns, the streets perform, to a certain extent, the functions of lungs in the human body, as M. Rohault de Fleury very properly observed; and the more capacious—the more carefully maintained these things are—the more effectually will they supply the air necessary for life. "Unfortunately," to continue our quotation, "narrow and winding streets are to be found in the greatest numbers; these streets, surrounded by lofty houses corbelling over their foundations, become receptacles for contaminated air; they are damp, cold, and unhealthy; ventilation hardly exists; the sun's light rarely penetrates them; and their inhabitants gradually fade away. It is in these streets that the greatest numbers of consumptive, scrofulous, and dropsical cases occur." M. Fleury's description applies, perhaps, with greater force to the ancient fortified towns of the continent, in which the modes of construction rendered necessary by the incessant state of war during the middle ages, have not been modified to suit the present state of civilisation, than it does to the majority of our English towns. But, nevertheless, there are, even in the heart of London itself, far too many streets in which it would be easy to observe all the evils above enumerated; and there are quarters of the town where Nero might well exercise his expeditious mode of removing obstacles to sanitary improvement. By the way, it is singular that Nero should have been so decided a sanitary reformer, and that he should have been so popular with the lower classes on that very account. It seems as though, at all times, the public were disposed to pardon the atrocities or illegalities of their rulers, when committed at the expense principally of the higher classes, provided that those said rulers appeared to study the personal comfort of the mass; but be this as it may, it is worthy of remark, that the monarchs who have the most effectually and energetically interfered to carry out works for improving the distribution or planning of towns, have been precisely those who inflicted the greatest moral injury upon the character and liberty of their people. Julius Cæsar and Nero may be cited as illustrations of this fact in ancient Roman history; in modern times the lesson has been, and is still being, as forcibly applied, and with the same results we fear.

It is a melancholy reflection, that good and evil should be thus ever intermingled in human affairs; but, really, the state of some densely peopled portions of large towns is often so awful, that even the despotism which overrules the legal difficulties in the way of their improvement may become to a certain extent desirable. Of course, we do not overlook the ultimate dangers attached to such systems of government, and are convinced that it is better "to bear the ills we have than fly to those we know not of;" but we do regret that the same energy in carrying out the works necessary to secure better sanitary arrangements should not prevail amongst legally constituted authorities, as may be noticed in more morally despicable ones. Our own municipal organisation hitherto has certainly not been able either to remedy the defective arrangements inherited from a former imperfect state of civilisation, or to prevent the growth of fresh evils of equal magnitude. There are very few towns in England in which the quarters inhabited by the lower or the working classes (as it is now the fashion to call them) are planned so as to secure the free circulation of air and light, so essential to the physical well-being of their population. In these districts, too little visited by the wealthy, the streets are narrow, ill-paved, and worse cleaned. Naturally, landowners endeavour to make the most of their land; and therefore the directions of the new streets are made with reference to that object rather than to the healthiness of their exposition. The dwellers in streets of the kind alluded to have rarely been members of the vestries or other paving boards; and it is notorious that both the carriage and foot ways therein have been sadly neglected; and that they are left in a state of filth, partly attributable, no doubt, to the habits of the neighbours, but which is aggravated by the carelessness with, and the distant epochs at, which the scavenging is performed. There are physical means enough at the disposal of engineers to secure good roads and footpaths, and it would be very easy to ensure their being kept in a proper state; but the first thing to be done to attain these desirable ends is, to awaken the attention of the authorities to the necessity for attending even more to these objects in the back streets, as they are called, than in the main thoroughfares themselves. The system of the "Bornes-fontaines" adopted in Paris might be introduced with great advantage to the sanitary condition of our narrower streets; because not only would the water thus allowed to flow remove much of the filth which is now allowed to contaminate the atmosphere until it pleases the parish contractor to remove it, but also because the running water itself would tend to improve the very nature of the air. Such a system would, however, be a source of evil rather than of good if it were introduced without at the same time rendering the water channels impermeable, or without providing for the rapid subterranean removal of the water and the materials it carries forward.

The dimensions of streets and back areas of houses, and the height of the houses themselves, have an influence upon the sanitary condition of a locality to the full as important as paving and drainage; at the same time, it may be added, that they ought to be regulated with reference to one another. In our own latitudes, it appears that the best rules to be observed in these details would be to make even the narrowest streets 40 feet in width (a regulation lately adopted by the Metropolitan Board of Works), to limit the height of the walls also to 40 feet, and to require that the open back area at the level of the first floor should be at least equal to the area of the house pro-

perly speaking; that is to say, without taking into account the outbuildings on the ground floor. It is not intended that these rules should be inflexibly applied; but we believe that it would be found materially to improve the sanitary conditions of town residence, if some regulations by means of which the open space around a house should be, as a minimum, made equal in area to one-and-a-half times that occuppied by the house. Apparently, the collecting together in a confined area a dense population has a great effect upon the rate of mortality; for, although we do not attach undue importance to mere arithmetical averages, it seems to us that the population returns may be cited as illustrating some of the most universal laws. Turning, then, to the more recent ones, it appears that in the district of London, in which there are said to be about 30 inhabitants per acre, the mortality is nearly 1 in 43·42; whilst in Hampshire, where there are only about 0·4 inhabitants per acre, the rate is about 1 in 49·4; and in Cumberland, where there are only about 0·15 inhabitants per acre, the rate of mortality is about 1 in 51. Nor can this law be considered to be local, for it prevails in parts of towns as well as in large districts—in foreign countries as well as in England.

We alluded to the necessity for paying attention to the direction of the main lines of communication, and for studying the exposition of houses; and the reason for doing so must be evident to those who consider how much the ventilation of a locality may be improved or injured by the greater or less obstruction offered to the prevailing winds. Of course, the advisability of giving the latter free access must depend upon their nature; but, as a general rule, it may be said that the main lines of thoroughfare in a town ought to be disposed in a parallel direction to the axis of the valley or district in which a town is built; and the lateral communications ought to be as nearly as possible normal to the same direction, in order to secure the most efficient ventilation, Few old cities have been built with reference to these principles, because the necessity for defence from external violence, or for communication with some great central establishment, induced the mediæval architects to deviate from laws which, nevertheless, they seem to have indistinctly perceived.

It is a fact worthy of remark, as illustrating the influence of exposition upon the sanitary state of a neighbourhood, that the mortality in the houses situated upon the North Quai of the Cité of Paris, which consequently face the north, is much greater than that prevailing on the South Quai.

THE ELECTION FOR SURVEYOR AND ENGINEER FOR THE TOWN OF HALIFAX.

It appears that the munificent terms of remuneration offered by the Local Board of Health of Halifax were tempting enough to secure a considerable number of applications for a post involving the discharge of such onerous and multifarious duties as were required by those "learned Thebans." There is no accounting for these things. Many a young man, without friends or introduction, who is compelled to earn his daily living, and who either has not the energy to carve out his own career, or the means of waiting until the bread he must, under such circumstances, cast upon the water shall come back to him—many such young men must naturally be found in an an old-established and highly civilised community; and to them the small competence offered by the Halifax Local Board must offer great temptations. It is not, therefore, to us a matter of surprise that many applications should have been made for the situation; but it is a matter of unfeigned surprise that Mr. Stevenson, the late partner of one of the superintending inspectors of the General Board of Health, who had used with the least reserve the opportunities for pushing the business of his firm offered by the corrupt system so indignantly stigmatised by Sir. B. Hall, should have placed himself in the list of candidates. Stranger still does it appear that, with the examples of Sheffield and Rotherham before their eyes, the Local Board of Halifax should have selected the man whom they have honoured with their confidence. It is said that wise men learn more by failure than by success: we fear that Mr. Stevenson, like all the late superintending inspectors, had many opportunities of benefiting by lessons of this description; and sincerely do we hope, though sometimes against hope, that the town of Halifax may profit by the experience so dearly purchased by some of the other clients of the General Board of Health.

In the meantime, we would observe that the choice of the Local Board of Halifax in nowise induces us to alter our opinion of the policy of their course. We repeat that there is, to our knowledge, only one man in England who possesses the whole of the qualifications they require; there is hardly a man able to conduct either the duties of the water or gas engineer to such a town who could not easily, if he were of known character and experience, obtain far more satisfactory conditions from private companies. Whatever may be the merits of the candidate selected, it must always be dangerous to intrust important duties to underpaid servants; and, to our minds, there is something approaching to dishonesty in the attempt to secure such results. The future will prove whether the inhabitants of Halifax enjoy a fortunate immunity from the ordinary consequences of what must be at any rate considered hazardous experiments. They may depend upon it, that the attempt to secure the fulfilment of duties which require great skill, learning, experience, character, and temper—the education, manners, and feeling of a gentleman—for a remuneration beneath that given to the foreman of a large factory, and little above what would be offered to a good clerk, is substantially to expose themselves to a risk they are not justified in incurring.

There is reported in the daily journals of the past fortnight a case in which the Local Board of Halifax appear as defendants in a case for a nuisance, resulting from the escape of the sewerage from some of their recently constructed works. Is the new surveyor to set to rights all other instances of this description arising from the improper execution of his predecessor's designs? It appears, from the short notice printed elsewhere, that the nuisance complained of was attributable to some failure in the pipes, which would hardly have occurred if the joints had been properly made; for Halifax is, beyond almost any town in England, adapted to receive a system of pipe sewerage. We will make further inquiries into this matter, and perhaps return to the subject.

ON THE INFLUENCE OF FOOD ON HEALTH.

A CORRESPONDENT, signing himself "A Vestryman," and whose letter will be found in its appropriate place in our columns, has pointed out in very expressive though homely language the occurrence of one of those hygienic phenomena to which it will be remembered a portion of our previous remarks on the principles of sanitary improvement had special reference. The instance thus brought forward is no less instructive than important, and strongly confirms the propriety of the course we have indicated with regard to the duties of the district medical officers. Our correspondent is not, we imagine, much acquainted with the pathology of disease, and therefore his assertion that "a regular cholera" was produced by the veal in question, must be received with caution, especially as "about 40 years" have elapsed since the event; but that a disease closely resembling cholera in respect to several of its most prominent symptoms, was generated as he has described, does not admit of doubt; and the question he very properly puts is, "Would the true origin of that disease have been discovered in London under existing circumstances?" We believe not, and hence the necessity for recording in the way we have described the dietetic peculiarities of each locality, and, so to say, dividing the metropolis into a number of villages.

But this is not the only point connected with our correspondent's letter that demands attention at the present moment: the kind of food of which he speaks was veal, and the manner of preparing this article for the market in England is altogether so objectionable as to require, in our opinion, immediate legislative interference. How or by what means the existing prejudice in favour of "white veal" was first brought about, it is now, perhaps, useless to inquire; enough that it exists, and is confined to this country—no such absurd prejudice being known on the continent. To secure this *whiteness*, it is necessary to employ a practice equally cruel to the animal and detrimental to the food; in other words, the poor creature is exsanguinated many hours, and sometimes days, before its death. Repeated bleedings are instituted upon it, until the powers of vitality are reduced to the lowest ebb, and the enfeebled action of the heart is insufficient to propel the blood through the small capillary vessels of the membranes of the eye, when the desired result is presumed to have been gained, or, in techinal language, "the calf is ready to be killed." Now it is extremely doubful whether, under the most favourable conditions, an animal thus treated is free from disease; but let us suppose a by no means uncommon case, and we shall see that disease is inevitable: the calf, we presume, has been duly

prepared by bleeding carried on during the last two days, and is now ready; meanwhile the butcher discovers that he is in no immediate want of veal; the calf is therefore sent back till next day. But what is the result? irritative fever instantly commences as a reactionary movement of the vital powers, and when the animal has been thus made to suffer under a severe inflammatory affection, it is killed and converted into food. The cruelty, then, of such a practice is not greater than its absurdity, since, even when perfectly successful, the veal thus procured is inferior in flavour to that obtained in a more natural way; for example, the veal of Paris is notoriously more wholesome, nutritious, and appetising than that of London. Strongly opposed, therefore, as we are to legislative interference in the affairs of trade, we would nevertheless advocate the prohibition of this whitening process, more especially if the future records of the medical inspectors shall, as we expect they will, demonstrate the mischievous effect which it produces upon the health of the populace.

It is not without much regret we notice a disposition on the part of many of the vestries to permit the medical district officer to continue in practice on his own account. The result will certainly prove a failure, and bring about the very state of things least to be desired. Had it been made conditional—that where no properly qualified candidate could be found willing to resign practice on accepting office, then, and then only, to have elected a medical man in actual practice—something might have been said in favour of such a mode of solving a difficulty. But to throw open the door at once, which places public duty and private interest in direct opposition, is so palpable a violation of the simplest principles of common sense, as to call for immediate condemnation. According to the old Roman maxim, "that which is worth doing at all is worth doing well;" and surely this must apply with great force to highly important duties like those of a district medical officer; but whenever the private interest of this officer calls him to other duties, to whom will he leave those of the "district?" Of course, to an assistant—most probably unqualified—most certainly inexperienced; and thus we shall obtain the shadow instead of the substance. It is presumed, indeed, that by electing men of standing in large practice, superior knowledge will be gained; but let an epidemic appear—let the "large private practice" become still "larger," as it then must do, and where is the "superior knowledge" we bargained for? In all human probability it is looking after "the respectable patients," whilst the "district" is confided to the self-satisfied sagacity of some raw unqualified youth, who for the sum of £40 per annum has undertaken to do anything, except "visit the said respectable patients." Men already in practice and doing well, ought to be above the meanness of seeking to absorb offices of this kind; and beyond doubt they would be so, unless the position is made a "stepping-stone" to private practice in the way proposed to be done. In such a case, self-defence will compel them to use all their interest to exclude a rising compeer; and thus a state of things ensues, similar to that governmental system which advances influence at the expense of talent, and fills our public offices with avarice and imbecility.

If, after a fair trial, it is found that duly qualified men are not to be obtained, who will undertake the duties of district inspector on the condition of abandoning all other practice, then the plan now proposed might be admissible; but we are convinced that no difficulty of this kind would ever occur where a reasonable remuneration was offered. If, however, it did occur in any instance, and a medical man in actual practice could alone be procured, then a stipulation should be made, requiring him to keep a properly qualified member of the profession as an assistant, and not a mere compounder of medicines. We sincerely hope that, ere it is too late, the different vestries will revoke their pernicious propositions, and endeavour to secure a hygienic record corresponding to the intelligence of the age and country we live in.

LORD SHAFTESBURY'S ACT FOR FACILITATING THE ERECTION OF DWELLING-HOUSES FOR THE LABOURING CLASSES.

On the 14th of August last, the royal assent was given to the Act 18 and 19 Vic., c. 132, which had been introduced and passed through the legislature, mainly by the efforts of Lord Shaftesbury. The preamble states, that "it is expedient that facilities should be afforded for the erection of healthful and commodious dwellings for the labouring classes;" and in substance it provides that any number of persons, not less than six, may form themselves into a company, with limited liability, for the purpose of erecting such dwellings, on the conditions that they are to be constructed to the satisfaction of the General Board of Health, with respect to their drainage, ventilation, supply of water, and necessary conveniences; and that any person appointed by the General Board of Health shall at all reasonable times be entitled to inspect them. The Companies' Clauses and the Lands' Clauses Consolidation Acts are incorporated in this apparently short and simple measure.

Now, unquestionably, it would be very desirable to attain a thorough reform in the class of dwellings usually occupied by the poorer classes; and it is impossible for any one to entertain a profounder respect for Lord Shaftesbury's motives in introducing this measure than we do. But really it appears to us that there is a serious political danger in establishing an exceptional legislation in favour of a class, founded though that legislation be upon the noblest and kindest motives. The precedent thus set may easily be destorted, so as to adapt itself to circumstances entirely opposed to those it was designed to meet; and the interference with the rights of private enterprise, the unequal competition thus created in the employment of private capital may be extended, by less scrupulous hands, in a manner far more prejudicial to the real interests of society than even the horrible state of many of our town dwellings can ever be. Lord Shaftesbury has in this case, as in several others, fallen into the error of endeavouring to remedy a grievous temporary evil by a measure fraught with unknown ultimate consequences. Instead of awakening the consciences of household proprietors, or enlightening the labouring classes to their own wants, and also to their own defects, his lordship has had recourse to a very dangerous piece of legislation, the consequence of which he could never have foreseen. It is at all times preferable to enlighten men as to their duties, than to seek to compel them to observe the latter; but theoretical philanthropists are too impatient to trust to the slow but sure influence of the practical education of the classes who form the subjects of their anxiety.

Who constitute the "labouring classes?" We ourselves—journalists, engineers, solicitors, professional men of any description, labour as assiduously, and often far more hardly, at our vocations than any men working for daily wages. Alas! we know full well that at times men of our class work also for day wages, and have to struggle hard, to labour early and late, in season and out of season, to secure a very meagre subsistence. Look at the case of the surveyor to the Halifax Local Board of Health—expected to be learned in all arts and sciences, to be a gentleman and a man of character, and to content himself with £250 a year! Such men are as much of the labouring classes as any carpenter or farm labourer. Headwork uses up life much faster than manual labour; and there are too many professional men who, like the Halifax surveyor, are called upon to keep up appearances on resources beneath those of many so-called day labourers. Why should not the erection of dwellings for men of this class be facilitated as much as the erection of dwellings for those whose only title to particular favour appears to be, that they are dirtier and more improvident? And, indeed, as the act stands, how can it be prevented from being applied to the erection (why could not these learned advocates for examinations and diplomas use the more correct word, "construction"?) of dwellings for any persons engaged in business, through the instrumentality of companies with limited liability? Far be it from us to attempt to throw any impediment in the way of efficacious measures to improve the condition of those who cannot defend themselves; but we do most decidedly object to the attempt to confer privileges which may interfere with the proper normal action of society. If the principle of limited liability be properly applied in the case immediately before us, it must be applicable to all of the same description; and we cannot see why Westbournia, or some parts of Belgravia, should not as well be built under its protection as the so-called Model Lodgings.

The worst part of the Labourers' Dwelling Act, 1855, is, however, that which renders it necessary to obtain the sanction of the General Board of Health to the essential details of the constructions. After the notorious proofs of incapacity given by that body, their approval or disapproval will not confer any sanction on a style of construction or arrangement. On the contrary, it is to be suspected that their approval will only be given on the condition of servilely adopting their

crotchets upon water supply and drainage. These things are far more satisfactorily arranged by private parties, according to local circumstances, than they can be by a body of abstract theorists, who have proved themselves to be utterly incompetent to deal with the ever-varying conditions of practice. Besides this, why need the company about to build houses in Yorkshire send its plans for approval by a board in London, when, perhaps, there may be a Local Board of Health in the very town where they propose to operate? It really seems as if the General Board of Health were seeking to create for itself new sources of employment and patronage.

However, we observe that at Norwich an essay is about to be made of the application of the act. Most sincerely do we wish that the benevolent intentions of the promoters of this movement may succeed in the attainment of their object—the improvement of the dwellings of their poorer brethren.

Circular to Gas Companies.

It has transpired that Mr. Sergeant Channel, the arbitrator to whom the case of Broadbent *v.* the Imperial Gas Company was referred, has given his award against the company, with £350 damages. The case was partly heard before the Court of Common Pleas in June, 1854, and reported in our columns for July of that year.*

The plaintiff is a market gardener at Fulham, and occupies on lease some garden ground adjoining the extensive works of the defendants, and the declaration alleged that they carried on their works so negligently that large quantities of smoke and vapours escaped from them, and came therefrom to the lands and premises of the plaintiff, which were in consequence thereof rendered unfit to be used as market gardens. Chief Justice Jervis stopped the case when two witnesses had been examined, and strongly pressed the parties to consent to a reference, the result of which is a verdict for the plaintiff, as above stated. The proceedings having been conducted in private, we are unable to continue our report of the evidence, and are consequently not in a position to judge how far it justifies the award; but it is greatly to be feared the precedent will be followed by other occupiers of land similarly situated, and be made the ground of extortionate demands upon companies who have erected gas-works in suburban districts, in the expectation of being exempt from the inconveniences and anoyances of carrying on their operations in populous neighbourhoods.

No drafts of bills have been lodged in the cases of the Peterborough Gas, Reading Local Board of Health, Reading Union Gas, and Reading Gas, and the remaining applications to Parliament for gas acts are of the ordinary character, and not likely to give rise to opposition. The bill promoted by the proprietors of the Gainsborough Gas Works contains some novel provisions for the protection of the public, and also for meeting the contingency of a rise in the price of coals, which may form precedents for future legislation. It is proposed that:—

It shall be lawful for the company to contract with any person or persons to manufacture gas; and also to let the said works, machinery, apparatus, main-pipes, and all other matters and things necessary for the manufacture and supply of gas to any person or persons, either from year to year, or for a term of years, at such rent as may be agreed upon; provided always, that in case the company should either contract for the manufacture of gas, or let the works, the company shall in no way be released from any liabilities, obligations, and engagements to which they are by this act, or by the acts incorporated herewith, subject and liable; but the same liabilities, obligations, and engagements shall remain in full force and effect.

On the expiration of the existing contract for lighting the street-lamps, the company shall be required to supply the street lamps either by meter or by contract, as the said local board or other persons having the lighting of the streets may elect; and in no case shall the company have power to charge for the gas supplied to the street-lamps a higher price than the average price charged to other consumers.

The gas to be supplied by the company shall be of such quality as to produce from an argand burner, having 15 holes and a 7-in. chimney, and consuming five cubic feet of gas an hour, a light equal in intensity to the light produced by 12 wax candles of six in the pound, burning 120 grains an hour.

The highest charge by the company for gas supplied by meter shall not exceed the rate of 5s. 6d. per 1000 cubic feet, unless the cost of the best Yorkshire Silkstone coals at the Gainsborough Gas Works shall exceed 15s. per ton; in which case the maximum price for gas shall be increased 6d. per 1000 cubic feet, and shall be further increased 6d. per 1000 cubic feet for every additional 5s. cost per ton of the said coals, or for any fractional part thereof.

Every private consumer of gas supplied by the company shall, if required by the company, consume the gas supplied to him by meter; and such meter, if provided by the consumer, shall be approved by the company before it is used, and during the user thereof; and the company shall, if required by the consumer, supply the meter, and shall be entitled to charge for the use thereof the following rents, namely:—For a 2-light meter, 2s. 8d. per annum; for a 3-light meter, 4s. 4d. per annum; for a 5-light meter, 5s. 4d. per annum; for a 10-light meter, 6s. 8d. per annum; for a 20-light meter, 9s. per annum. Provided always, that the company shall not be bound to supply any meter exceeding a 20-light meter, and that the charge for the use of a meter shall be for one whole year, and shall be payable in advance; and (if required by the company) the consumer requiring the meter shall give good and sufficient security for the said meter; and if the company and the consumer cannot agree upon the security so to be given, the same shall be determined by one or more of her Majesty's justices of the peace, acting as aforesaid, and the decision of such justice or justices shall be final and conclusive.

The justices, as aforesaid, may from time to time, if they think fit, appoint an inspector of meters; and such inspector shall have at all times, on the application and at the expense of any consumer, a right to inspect and to test the meter or meters erected or placed by the company on the premises of the person making such request, after giving twenty-four hours' notice in writing of such intended inspection to the company; and if on any such inspection the said inspector shall find that any such meter is not a good and proper meter, or does not accurately register the quantity of gas consumed, the company shall remove the same, and supply its place with a good or proper meter, on being requested in writing by such consumer so to do, and on having such security (if required by them) as is by this act provided for; and in failure thereof for seven days shall forfeit to such consumer not exceeding 20s. for each day during which such failure continues.

The arbitrators and umpire in the Deptford case have, since our last, devoted six consecutive days to the hearing of the engineering evidence tendered on behalf of the Surrey, and have adjourned *sine die*. We defer our report of the evidence till the termination of the proceedings, but in the mean time it may be interesting to gas companies to be made aware of Mr. Croll's decided opinion, that districts similar in character and extent to Deptford cannot be profitably supplied with gas at 4s. 6d. per 1000 feet, and that 5s. or 6s. would not be too high.

We understand the northern coal owners are exhibiting a disposition to accept contracts on slightly reduced terms for shipment during next summer.

* *Vide* page 482, Vol. III.

Communicated Articles.

MEASUREMENT OF GASES.

By W. J. Warner.

How is gas measured? Such a simple and common question should be readily answered by every one who has any pretensions to be more than a novice in the gas world. So far from this being the case, every gas engineer from John o'Groat's to the Land's End must now not only be putting this interrogation, but also be asking himself, Is there no standard of measure? It may be said that the questions have been answered, and the measurement of gas thoroughly explained over and over again. But how? By a reference to the mechanism for the purpose, instead of an intelligible explanation of the principle upon which the action of that mechanism is dependent. And this has occurred not only in conversation, but in writing. Take up any book or paper in which reference is made to the measurement of gas, and ten chances to one but there will be something similar to the following:—"Gas is measured by being admitted into a cylindrical case, within which revolves," in water a little above the horizontal axis of the case, "a shorter cylinder, or drum, divided into four compartments; the capacity of these being known, the quantity of gas will be known also." "Gas is also measured by the alternate expansion and contraction of a chamber, which may very aptly be compared to expanding and the contracting chamber of a bellows." Then follows a dissertation, the length of which varies according to the taste and prejudices of the author, upon diaphragms, flexible partitions, floats, valves, cranks, levers, syphons and water levels; but not one word about *displacement*—the principle alone upon which gas can be measured.

Although these instruments, or meters, and their constituent parts, are apparently described in such a scientific manner, it is astonishing what a little knowledge upon this subject some of the writers upon it possess. Several proofs of this may be given. In the last Treatise on Gas-works one is to be found. The writer, Mr. Hughes, in describing Defries' meter, says it has "*three* measuring chambers, separated from each other by flexible partitions of leather." If this meter were constructed as described, it would be the most imperfect one at present made, instead of being in some respects, if properly manufactured, the most perfect. The meter in question has not *three* but *six* measuring chambers, and they are formed by three *inflexible*, not *flexible*, partitions, forming three chambers, which are subdivided by the three flexible partitions or diaphragms. And again, even Mr. Clegg, jun., is not, to say the least, too precise when describing the wet meter in his work on "Gas Lighting." He says, "as the chambers of it (the drum) fill with gas, it *displaces* the *water* and causes the drum to revolve." Now, every one who really understands the subject must know that, if the gas were measured by the water being displaced from the chambers of the drum, it would not revolve;—the machine could not work, as the water, if I may be allowed the expression, is the fulcrum upon which the gas acts to force the wheel round. This error, and what I have already said upon the subject, are sufficient to prove that some, and those the highest authorities too who have written upon meters have not been qualified for the task, and others have grossly neglected the subject upon which they have presumed to write; it is also evident that these persons either entirely overlooked the

principle of displacement or had only very confused ideas upon the subject; and these are the causes which have led to so much recent twaddle upon the measurement of gases. Had the principle of displacement been kept constantly and steadily in view by those who understand it, we should not have had the painful sight of beholding the oldest and most experienced in the gas world sacrificing to theory the reputation acquired by a life devoted to scientific and practical pursuits. I allude to Mr. Clegg (a gentleman of whom I would speak with the greatest respect) pressing so strongly the matter of the measurement of gases being affected by their quality. Before I dwell upon this, I will reply to the interrogations—How is gas measured? Is there a standard measure?

That space in any closed gas-tight vessel, which may be exactly occupied by a 1000 ounces of distilled water at a temperature of 60°, is a standard measure of a cubic foot of gas, and is invariably the same in Liverpool or London. The accuracy of this measure does not depend upon its being nicely constructed; it may be in shape regular or irregular, but I will suppose it to be cylindrical, with its axis vertical. This vessel may be any size, if large enough, as the gas is measured by being admitted into the vessel, and allowed to displace or force the water from the vessel through an opening in the lowest part of it. The gas being turned off when 1000 ounces of water are displaced, occupying the space which the water did, will be a cubic foot: the gas and water being at the same temperature, 60°, and the pressure of the gas that of the atmosphere, with the barometer at 30 inches. I need not enlarge upon the admirable simplicity and accuracy of this standard; therefore I will at once explain how it may be affected by external circumstances.

If the capacity of the vessel from which the water is displaced be greater than a cubic foot, and filled before the 1000 ounces are displaced, no more than that quantity of water will leave the vessel, although the orifice, if it be not too large, from which the water was forced be left open when the gas is turned off after having displaced the 1000 ounces. This is evident, as the gas in the vessel and above the water has no greater power to force the water out than the atmosphere has to force its way into the vessel through the water: in other words, the whole is in equilibrium; but if a fire be placed under the vessel, it will not be in such a condition long: the water, as it gets hot, will communicate its heat to the gas, which expanding will, of course, increase its pressure, and force more water from the vessel; this being added to the 1000 ounces already run off, would indicate more than a cubic foot of gas measured. Thus it will be seen that, as this standard is affected by temperature, it must be carefully attended to; and as the arrangement for measuring gas by wet meters is analagous to that above described, it is also affected in the same manner. This was clearly explained by Mr. Taunton, the City of London Corporation meter tester, in his evidence before the Committee of Gas Inquiry at Liverpool. I will give his own words upon the subject. In a reply to the chairman, he says—"The heat would cause *expansion* of the gas, and the (wet) meter would consequently *register more*." This must be admitted by all; but who would believe the following sentence?—"Heat would *not affect* a dry meter." I do not; but as I will not publicly doubt that gentleman's veracity without putting his assertion to the test of common sense, I must crave a little indulgence, and again refer to the cylindrical vessel. In doing so, I will suppose no water to be left in it when the 1000 ounces are displaced; and also, that the top end is attached to the cylindrical body in such a way that the end will be at liberty to move, without any gas escaping, to and from the body, in a manner analogous to the opening and closing of a bellows. Now what will be the effect if the vessel full of gas, with the orifice closed through which the water was displaced, be put over a fire the same as before, when water was in it? It cannot, I think, be denied that the vessel would get hot; and if so, the gas inside of it would also become hot, and expand, which would raise the cover in the same ratio to the heat imparted to the gas, as in the former case water was displaced, only the effect upon the cover, which I suppose to be without weight, or counterbalanced, would be sooner visible than upon the water, from its having to be raised to the temperature of the containing vessel before the gas could be influenced to the same extent as in the vessel without the water. As the standard with water in, as in the former case, is analogous to the measure of the wet meter, so the last arrangement explained—the movable cover, with its flexible band, or bag, is identically the same as the *measure* of the *dry meter*; and as the same gases are alike affected by the same temperature, the *registration* of both *wet* and *dry* meters must be influenced, though generally it may be considered of no practical importance, by temperature. I have now shown another error connected with the measurement of gases, which must demonstrate that he who committed it was not, the same as in the other cases adduced, qualified to do the work upon which he was employed; or (and, occupying the position which he did, such an alternative should be deemed impossible) he was a prejudiced person, instead of being an impartial referee.

A word or two now about pressure affecting the registration of meters, as much has been said of late in Liverpool upon it. This is not a new subject; it is in a new form only; for as some of the would-be intelligent people of Liverpool have thought that their meters have been influenced by pressure, so the same opinion was prevalent in London about twelve years ago. Only mark the difference! the Liverpool folks have had too much pressure, but the Londoners could not get enough, as is evident from the following extract from the *Mechanic's Magazine* for 1843:—"Owing to the sinuosity which the gas has to pass through on its way to the cylinder or drum, it becomes so *enfeebled* that the measuring chambers in it are not *properly filled*." Let this be compared with the following, which I give to the good people of Liverpool without any comment upon it, or upon those persons who have made such a clamour about pressure; it is by Mr. Wright, and is to be found in the same volume of the magazine to which I have already alluded:—"Increase of pressure," he says, "would increase the density of the gas, but not the capacity of the chambers" or measures "of the drum."

I have now only to notice that the *quality* of gases measured does *not influence* the measurement. Upon this point, I am aware I apparently differ from a very high authority, but I can make the matter quite clear to your readers, and demonstrate that the measurement of gases is not, and cannot possibly be, influenced by their quality. To do this I must again refer to the standard measure. It will be remembered that, in speaking of it I said, the standard measure is that space in any closed vessel which may be occupied by 1000 ounces of water; and, also, that a cubic foot of gas may be measured by displacing a 1000 ounces of water by gas from any closed vessel. Now it must be quite evident to any one of the meanest capacity, that when 1000 ounces of water are displaced by gas from any vessel, the gas occupying that space which the water did, must be a cubic foot, whatever its quality—whether it be the lightest or the heaviest, the best or the worst. To measure a cubic foot of any gas, the standard is the same, and 1000 ounces of water must be displaced; and when that quantity is displaced, the gas occupying the space which the water did is a cubic foot. As Mr. Clegg must be aware of this, it is to be deeply regretted that he did not, in his answer to the Gas Company's reply to the report of the Committee of Inquiry at Liverpool, try to clear up the matter, instead of adding to its mystification by publishing algebraical formula for calculating the flow of fluids through pipes.

Mr. Clegg probably *meant* to say, that if an inferior gas be supplied, more of it will have to be used, to obtain the same amount of light, than of superior gas, and consequently more will have to be measured. He surely did not desire it to be understood that, when an inferior and light gas (these are not synonymous terms, although he assumes them to be so) is measured by the meters in general use, they indicate more gas than passed through, or that more is registered by the index than is measured by the drum. If this be what he means, I challenge him, or any one else who will make the same assertion, to prove it; but if it be not, he certainly has committed an act of injustice to the Liverpool Company and his own good name by allowing the following paragraph from the report of the Committee of Inquiry to remain upon record without some explanation:—"Your committee can only 'adopt' Mr. Clegg's opinion, that the *quality of the gas materially affects the registration*."

I am surprised that Mr. Clegg has said so much about the flow of gases through a meter being affected by the quality of the gases, as he is the patentee of more than one apparatus for measuring gas simply by its flow through pipes or orifices, under a regulated and equal pressure. From the specifications of such patents, it is quite evident that he did not consider the *variation* of the *quality* of any *practical* importance, and of course made no allowance for it; nor has he mentioned such a thing in his last specification, nor in the former, as far as I can remember. The last specification was sealed on the 19th of February, 1853. "The object of this meter," the patentee says, "is to measure gas by passing it at an uniform pressure through an opening whose area is adjusted according to the *quantity*" (not quality) "of gas drawn from the meter by the burners."

The apparatus consists of a gas-governor, by which the pressure of the gas is regulated as it flows from the main. From the governor the gas "is conveyed through a slide-valve into a gasholder, which, rising or falling, decreases or increases the area of the opening of the slide-valve; and since the pressure of the gas arriving at the opening of the slide-valve is rendered perfectly equal by the first-named governor, the *quantity* of *gas* passing through *equal openings will always* be the same; or, which is the same thing, the *quantity* of *gas delivered* by the *openings* will be *according* to the *area* of the *openings*. The *area* of the valve *opening* being adjusted by previous experiment to the total *quantity* of *gas* the *meter is intended to register*, will become an *unerring measure* for all *less quantities* as *well*, because the pressure is always uniform, and the area of the opening in exact proportion to the quantity of gas discharged through it; such opening becoming thus a measure for the gas passing through it; and as the position of the slide-valve and the gasholder influences the length of a stroke of a lever vibrating upon a fixed point, such vibration being maintained at one uniform speed by clock-work, it follows that the number of vibrations and the length of stroke being registered upon a dial, such dial will give the *true quantity* of *gas* which has *passed through* the *meter*."

I have given the substance of the specification, that the reader may judge whether Mr. Clegg is consistent in pressing so closely and earnestly the subject of the registration of meters being affected by the quality of the gas measured.

EXAMINATION OF THE PROCESS OF MAKING GAS FROM COAL AND FROM WATER.

(*Continued from page* 11.)

"*Process of M. Galy Cazalet for the Distillation of Coal.*

"The apparatus consists of a vertical furnace, arranged like a founder's cupola, that is to say, composed of an interior lining of refractory materials, coated externally with a casing of cast or sheet iron. The throat, or upper orifice, of the furnace is so arranged as to receive, at the required moment, a hermetically closed lid, produced by means of a circular groove, filled with a melted metallic alloy, in which the lower edge of the cover is plunged. The furnace contains a conical cavity, small at the bottom and large at the top, in which there is a door at one side, intended for charging the apparatus; and on the other there is an orifice, which receives the gaseous products of combustion, and allows them to circulate round a steam-generator. At the same time a supply of fresh air serves to burn them more or less completely. Thus the heat disengaged during this combustion is employed to vapourise a part of the water contained in the boiler. By means of a door at the bottom of the furnace there may be withdrawn when wanted either the coke or the residue of the combustion and of the distillation carried on in the interior of the apparatus.

"The lighting of the furnace, and its progressive charge of coke, are effected in the ordinary conditions of furnaces of foundries of the second fusion. The atmospheric air requisite to bring the masses to a uniform state of incandescence is supplied to the apparatus at the required pressure by a large circular pipe, whence it is diffused to a series of *tuyeres*, arranged symmetrically round a horizontal circumference, that the combustion may be regulated—increased or moderated—at will, either by varying the orifice of the alimentary pipe, or, if required, by increasing the combustion by a jet of steam, taken from the neighbouring boiler already mentioned, and thrown into the chimney, which surmounts the vault of the furnace. When the mass of coke which fills the apparatus is raised to the required temperature, the jet of steam is stopped, the nozzle of the pipe is closed, and the access of air is suspended. Glass eyes introduced into the exterior coating of the furnace allow the interior temperature of the apparatus to be ascertained; and, what is especially important, to perceive the uniform diffusion of heat in the mass.

"The arrangements being thus made, we will suppose with M. Galy that the furnace then contains 3000 *kilogrammes of coke raised to a clear cherry-red heat.* At that instant the door for charging is opened, and there is thrown into the furnace 1000 *kilogrammes of coal to be distilled.* The hermetical cover is lowered into the groove containing liquid metal alloy; and the apparatus is then a closed vessel—a kind of *vertical retort.* The coal, placed upon the top, and resting on an incandescent mass, permeable to gases, vapours, and liquids, heats rapidly from below upwards. The distillation commences, is developed and finished relatively in a very short time. The gaseous products, and the vapours of the hydrocarbons are forced to descend through the mass of coke, and mix in their crude state, whilst gradually combining under the conditions most favourable for the production of bicarburetted gas. In order that the effects should take place as stated, it is necessary and is sufficient, as we believe, that on the one hand the mass passed through by the products of distillation should be relatively sufficiently large to produce little sensible variation of temperature; on the other hand that the depth to which this mass is spread out should be sufficiently limited, so that the descending progress of the products of distillation should not be prolonged beyond the time necessary for the production of bicarburetted hydrogen. When arrived at the lower part of the apparatus, the gaseous products are drawn by a second series of tubes, symmetrically spread over the extent of the apparatus, uniting in a circular pipe, by which they are conducted to the purifiers.

"After a fixed time, which industrial practice of the process can alone determine, it seems rational to us to hope, that the coal will be completely distilled without any cessation of the conditions for a single instant which produce in ordinary gas-making the maximum of lighting power.

"Let us pause to estimate the products obtained, and to endeavour to arrive at the temperature preserved by the solid mass then present in apparatus.

"We think it will be admitted that the 1000 kilogrammes of coal will produce 380 cubic mètres of illuminating gas, 670 kilogrammes of coke, and 55 kilogrammes of ammoniacal residue. According to M. Payen, the gas produced during the best period of the ordinary process would be composed thus:—

		Cubic feet.
13·	per cent. olefiant gas.....	1,744·014
82·5	„ proto-carburetted gas ..	11,069·685
3·2	„ carbonic oxide	439·369
1·3	„ azote	174·401

"But, anxious to avoid all chances of deception, we wish to estimate the products below the reality; consequently, we will only admit that the gaseous products have a composition analagous to that indicated by the gas companies, according to the following statement:—

"Three hundred and forty cubic mètres instead of three hundred and eighty of ordinary illuminating gas (equal to 12005·4 cubic feet) composed of—

	Cubic feet.	lbs.
Olefiant gas	750·337.....	59·601
Proto-carburetted gas	8753·913.....	399·016
Carbonic oxide	1525·707.....	61·762
Sulphurous acid	375·168.....	36·338
Total of gaseous products.....		656·714
Coke.....		1477·350
Ammoniacal liquors.....		104·781
Total		2138·848

"If the gases have been produced and disengaged at a temperature of 900°, it will be found that the quantity of heat absorbed, estimating it at the average capacity for caloric of each of the different products, is—

For olefiant gas.....	6·027
„ proto-carburetted gas.....	42·120
„ carbonic oxide	13·572
„ sulphuretted hydrogen	2·520
„ ammoniacal residue	42·702
	107·301 calorics.

"This number of the measures of heat corresponds to that produced by the combustion of 36·382 lbs. of carbon, or 41·895 lbs. of coke.

"If there were any fear that this quantity of heat carried off by the products of distillation was, relatively to the total caloric of the incandescent mass, a fraction so considerable that the lowering of the temperaure resulting from it produced injurious effects, it would be easy to produce circumstances more favourable for the maintenance of a temperature sensibly constant. It would be sufficient in effect to have a furnace with a capacity sufficiently large that the mass of coke, which ought to be employed exclusively as a reservoir and regulator of the heat, should be 4000 kilogrammes instead of 3000, and even more if it were required.

"Thus, for example, in representing by 0·27 the specific caloric of the coke, and in endeavouring to find the number of degrees of temperature the mass has been lowered by the distillation, we have—

$$3000 \text{ kils.} \times 0{\cdot}27 \times X° = 107{\cdot}300\ X = 132°.$$

"Supposing the mass raised to 4000 or 5000 kilogrammes, instead of 3000 kilogrammes, we should have—

$$4000 \text{ kils.} \times 0{\cdot}27 \times X = 107{\cdot}300\ X' = 99°$$
$$5000 \text{ kils.} \times 0{\cdot}27 \times X'' = 107{\cdot}300\ X'' = 79°$$

"Be that as it may, and resting on the limit admitted by M. Galy, the furnace will contain at the end of the distillation—

3000 kils. (6615 lbs.), the initial and constant mass;
670 „ (1477 lbs.), the products of the distillation of 1000 kilogrammes of coal.
3670 kilogrammes.

"To make our calculations of the heat complete, it will be necessary to take into account the quantity of heat lost through the sides of the apparatus during the distillation, and of that expended and of that lost at the throat of the furnace during the charging of the coal. We cannot estimate their extent; but we admit, if it be desired, that this quantity is equal to 33 per cent. of the heat carried off by the products of distillation, say to 35·800 measures of heat. The result is, that the total caloric absorbed by the products of distillation is represented by 143·100 measures of heat.

"That if at the end of a distillation, and operating according to the actual mode of making gas, it was required to proceed immediately to a new distillation, it would be necessary—

"1st. To extract a certain quantity of coke from the furnace;

"2nd. To reheat the mass preserved in the furnace, and to raise it to the required temperature, of 900°, for example.

"To restore to the furnace, when a second distillation is required, the 143·100 measures of heat absorbed by the preceding operation, it will be necessary to burn 22 kilogrammes of coke; that is to say, instead of extracting the 670 kilogrammes of products by the first distillation, we should have to extract only 648. Admitting, in short, that the loss of heat that will take place at the charging-door must be considered equivalent to the heat produced by the combustion of 8 kilogrammes of coke, we shall find that the quantity of coke to be extracted will not exceed 640 kilogrammes. On these facts, the cost of the produce of a cubic mètre of gas obtained by the system of distillation proposed by our colleague would be easily established.

(*To be continued.*)

BURLINGTON HOUSE IN 1856.

THE former scene of revelry at Burlington House has completely changed its character since days of yore. The table of its banqueting-hall, instead of groaning under a load of viands, with their accompanying flagons of wine, are now covered with paper and accompanying inkstands; the festive and gaily dressed company of lords and ladies have given place to a sober body of middle-aged men, sombrely habited; whilst the joyous laugh, the

ringing of glasses, and the sound of general talking, have been succeeded by the knocking of the chairman's hammer, cries of "Hear, hear!" and dull business speeches.

The present *locale* of the Metropolitan Board of Works is, indeed, not much in accordance with the nature of the duties they have to perform; nor are the arrangements of a kind fitting to the important affairs committed to their charge. It is true, that the place of meeting is but temporary; and in the expectation of shortly occupying a more appropriate and commodious building, with suitable provisions for the comforts of the members and for the dignity of their office, they may endure for a time the inconveniences of the existing want of accommodation, for which the showy grandeur of the banqueting-hall is but poor compensation. In the meanwhile, we will describe things as they are, for the satisfaction of those who desire to know something of the place where the board hold their meetings, of the manner of their proceedings, and of the appearance of the men on whom so much that concerns the welfare of the inhabitants of London depends.

The high, black-looking wall on the north side of Piccadilly effectually excludes all view of Burlington House, and the gates that admit into the court-yard are only partially if at all open during the meetings of the board; so that no one not acquainted with the fact would be aware that an extensive mansion is situated behind those walls, nor could conceive that important public business was being transacted within that gloomy-looking building. After opening the gate, the visitor who for the first time attends these meetings is at a loss where to go. On each side there is a range of handsome buildings, and one immediately before him, the door of which stands open. He advances towards it, ascends a flight of steps, and finds himself in a large hall, where there is no usher, not even a policeman, to direct the way. A stray messenger, or servant out of livery, perhaps appears, to whom the visitor applies for information, when he is told to go through the open door on the right hand and ascend the staircase. After traversing several empty passages, he comes to a back staircase, at the top of which there is a door; and, on opening it, he enters a large room crowded with people standing about a long table covered with red cloth. Seated round the table are the members of the board; but, as there is not a sufficient number of chairs to accommodate the whole of them, several stand near the table mingled with the visitors. For the public there is no sitting accommodation; and the reporters for the press are obliged to stand in the crowd, or are mounted on a bench, pursuing their arduous labours under greater difficulties than the reporters in the old House of Commons, at the time when reporting the debates was considered a breach of privilege. Half-way down, on one side of the long table, is seated the chairman of the board, slightly elevated above the rest, with hammer in hand, which, on exciting occasions, like that on Friday last, was put in frequent requisition in preventing more than one member from speaking at a time. The chairman discharges the duties of his office with firmness, and the sound of his hammer is quickly attended to. His appearance is that of a man about 45 years of age, with a dark complexion, and a countenance marked by reflection. The members of the board generally seem to be in the prime of life. There are two or three exceptions leaning towards age, but none can be considered as young men. Most of them give physiognomical indications of more than average intelligence, and their appearance as a body is highly creditable to the constituencies by whom they have been elected. The banqueting-room wherein they assemble is strangely out of character with the business-like presentment of the members, and with what they have to do. The lofty, arched ceiling is deeply panelled, richly decorated, and gorgeously gilded; the walls, however, are inconsistently plain, now that the paintings which once ornamented them are removed, and add to the incongruity of the scene, which is but dimly illuminated by windows at each end of the long room. There is also a great want of proper attendants, not only to give dignity to the proceedings, but to preserve order among the public visitors, some of whom we have heard join in cheering the speakers. As it is, the members have to jostle through the crowd to reach the table; and, as they wear no official costume, their passage to and fro is liable to be resisted. The attendance of some policemen might at all events be obtained, to give some show of authority to the board in its present stage of initiation

Correspondence.

THE LIVERPOOL METER TESTINGS.

SIR,—In the *Gas and Water Times* of the 15th inst., I find a letter addressed to Mr. Kitchen, the chairman of the Gas Inquiry Committee of the Liverpool Town Council. As I am frequently referred to in it, and as I was directed by Mr. King especially to attend to Mr. Taunton's requirements, I think it incumbent on me to refute some of the erroneous statements contained in his letter and report.

Mr. Taunton states that Mr. King did not object to his mode of testing the consumers' meters in Liverpool, and that I also gave my sanction to all his experiments. Mr. Taunton attempts to support his statements by saying that he attended to all suggestions made by me. How far he is correct in these statements, and the good reasons Mr. King had for not approving of his mode of proceeding, I think will appear from the following facts:—

On the 7th July, Mr. Taunton was introduced to Mr. King by Mr. Kitchen at the company's office. On Mr. Kitchen explaining the purport of Mr. Taunton's visit to Liverpool, Mr. King, with his usual urbanity, and without hesitation, told Mr. Taunton he would willingly give him such assistance as he might require, and proffered the use of the company's testing apparatus. On the 9th July, Mr. Taunton had a large box conveyed to the company's office, which contained three dry meters—a 20-light, a 10-light, and a 5-light; there was also an old 3-light water meter, an old decayed drum of a 5-light meter, some tools, &c. I am thus particular in enumerating the contents of this box, because in his evidence before the committee Mr. Taunton says, "Before leaving London for Liverpool, I provided myself with accurate tested meters, both water meters and dry meters." Mr. Taunton must have known that this statement was untrue.

On the 10th July, Mr. Taunton tested his three dry meters by the company's apparatus, and found the 5 and 10 light correspond in their registration with the gasholder, but that the 20-light meter did not correspond. Mr. Taunton then connected the 20 and 10-light meters to the company's apparatus, so that the air passed from the testing apparatus through the two meters in succession; the 10-light agreed with the testing apparatus, but the 20-light showed the same amount of error as it did when tested separately, namely, 5 per cent. slow. After repeated trials, Mr. Taunton opened this "*accurately tested*" *meter, and altered the lever;* on trying it after the alteration, he declared that his dry meters were now correct. Mr. Taunton then tested his 3-light water meter, which he said, before he commenced, was 3 per cent. wrong, and on trial it proved to be so. Mr. Taunton expressed his admiration of our apparatus, which he said was the most accurate he ever met with, except his own. Having spent several days in these operations, on the 25th July Mr. Taunton commenced testing the consumers' meters, at Messrs. Jeffery and Morrish's establishment, known as Compton House, in Church Street, where there are nine meters in use. I accompanied Mr. Taunton for the purpose of watching his proceedings, but I was strictly enjoined not to interfere with his arrangements, either by approving or objecting to anything he did. The fourth meter tested was a 10-light, which Mr. Taunton pronounced to be 5 per cent. fast when tried by the *corrected* 20-light dry meter, which seemed to be a favourite, as it was always used. The trial was repeated by attaching the 10-light dry meter to the 20-light, so that the gas passed through the three meters in succession: the 20-light registered 19·88 cubic feet, and the 10-light registered 20·9, giving a difference in the registration of these two dry meters, of more than 5 per cent.

The last experiment was repeated, when it was found that the two dry meters registered the *same quantity*. When Mr. Taunton observed this want of uniformity between his two meters, he said, "These are rough experiments, and not worth recording;" but I thought otherwise. During this last experiment, Mr. King called at Compton House on his way home, and suggested that the 10-light water meter should be sent, with the water in it, to the company's office, and that a report of the testing should be sent to Mr. Taunton.

Mr. King then left, and we proceeded with the testing of the other meters. The report from the company's tester made the meter only 1½ per cent. fast. Mr. Taunton seemed so surprised at this result, that on the next day he discontinued his testing at Compton House, and recommended the examination of this *accurate* 20-light meter with the company's apparatus, when he discovered that it was now 2¼ per cent. slow; and, consequently, that all the meters which had been tested by it were made to appear to be 2¼ per cent. faster than Mr. Taunton's testing should have made them. Mr. Taunton again altered his meter, and again pronounced it correct, after the second alteration. In Mr. Taunton's report to the committee of his testings at Compton House, these errors in the testing are not noticed, but the results are given as if no error had ever been discovered; and I ask what confidence can be placed in any of his statements after he has dared to make an official report which he knew was incorrect?

I had frequently told Mr. Taunton that nothing would satisfy Mr. King or me but the usual test of the gasholder, and I had as often asked him why he adopted another mode of testing in Liverpool than that which he practised in London, and one which he admitted he had never before attempted.

After this adventure at Compton House, Mr. Taunton said he would go to Mr. Kitchen and tell him what had occurred, and that he would go to London and bring his own gasholder to Liverpool. He went to London, and was absent several days, but returned without his gasholder, assigning as a reason that he was not permitted to adopt any other mode of testing than that which he had already adopted. I told him, in reply, that he ought to do what he knew to be fair and correct, and not submit to the dictation of any one. On the afternoon of the 9th of August, I accompanied Mr. Taunton to the Liverpool Workhouse, when he commenced the examination of the meters of that establishment. A 45-light meter was found, by Mr. Taunton's test, to be 3 per cent. fast. The meter, when first tested by Mr. Taunton, was 1½ per cent. slow, being undercharged 165 cubic inches. When it was filled to the water-line, Mr. Taunton made it 3 per cent. fast. The next

morning, on reporting this to Mr. King, he desired me to send this meter, with the water in it, to be tested by the company's apparatus, and I took men with me for that purpose; but Mr. Taunton, instead of proceeding with the examination of the other meters, superintended its removal to the company's office himself, and never lost sight of the meter for a moment. On testing it by the gasholder, it was found to be not quite ½ per cent. fast; and when 165 cubic inches were taken out, to bring it into the same condition as it was at first, it was found to be 5 per cent. slow, or 3¾ per cent. different from Mr. Taunton's test. Mr. Taunton appeared perfectly confounded at this result; and, after repeating the trials several times, but always with the same results, he asked me, as a friend, to advise him what to do. I told him to act an honest and independent part, and to go, as I had often advised him, to the parties who employed him, and tell them that, if he was not allowed to proceed in his own way, he would give the matter up altogether.

He said he would do so, and went away. In an hour he returned, saying, "It is of no use; I must go on as I did before." On the following day, a 100-light meter was found short of water 40 cubic inches, and Mr. Taunton pronounced it 6 per cent. fast. On filling it to the water-line, he then made it 1½ per cent fast; so that the *addition* of 40 cubic inches *reduced* the registration 4¾ per cent. These experiments were so irregular, that Mr. Taunton said they must be discarded, as he was sure the small index-drum was turning on the upright shaft. This did not satisfy me; and in Mr. Taunton's presence I removed the cover of the index, and proved that such was not the fact.

Mr. Taunton lays great stress upon the testing of the meter at St. John's Market by the gasholder obtained from London. It must be observed that, although Mr. Taunton had frequently been advised to do so, he did not procure this gasholder until his labours in Liverpool were well-nigh ended; and this was the first and only occasion on which it was used. The capacity of this gasholder was 10 feet; and the accuracy of this trial may be judged of when I mention that the gasholder was filled and emptied *seventy-nine times* during the experiment, so that it included the "errors incident upon 79 stoppings and startings" of the gasholder.

Mr. Taunton in his letter refers to a conversation that took place at the town hall, at which I was present, during the testing of the meters at that place. Mr. Taunton has omitted one important observation made by Mr. King, in reply to Mr. Kitchen's inquiry, why Mr. King would object if the testings were not favourable; he remarked, "Because I consider that Mr. Taunton's testing is not worth a farthing!" He at the same time repeated, in the presence of Mr. Kitchen and Mr. Taunton, his instructions to me, that I was not to sanction or object to any of Mr. Taunton's proceedings. There are several other matters on which I should have liked to have offered some observations; but I fear I have already encroached too largely on your space and on the patience of your readers.

THOMAS EDWARDS.

Liverpool, Jan. 18, 1856.

SIR,—I find in my father's report to the committee of the Liverpool Town Council, dated Aug. 24, 1855, and quoted in your JOURNAL of Sept. 10, the following passage:—"Gas below the standard acts in two ways in propelling the meters faster than they should." The explanation given immediately after renders the meaning pretty clear, though it might have been expressed differently, perhaps, with advantage.

Strictly speaking, "gas below the standard" does not act in *two* ways to drive the meters faster, although the result is the same as if it did. Thus, for example, 24-candle gas issues from a burner regulated by its stop-cock at the rate of, say, 3 cubic feet per hour; 20-candle gas will issue from the same burner, through the same opening, at, say, 3·01 cubic feet per hour; and this extra ·01 cubic foot per hour will be registered by the meter, and be No. 1 cause for the meters revolving faster with the 20 than with the 24 candle gas. No. 2 cause is produced by consumers opening the stop-cocks wider, to get the same light from the lighter as they did from the heavier gas, making the meters revolve faster still. Strictly speaking, gas below the standard only acts in *one* way to propel the meters faster, although producing two causes for increased velocity. This was my father's meaning, who has deputed me to write to you, as he is not well enough to do so himself.

SAMUEL CLEGG, Jun.

11, *Buckingham Street, Adelphi, Jan.* 21, 1856.

L. T.'s SUGGESTION FOR THE MANAGEMENT OF RETORTS.

SIR,—Permit me to say that, when this company commenced supplying cannel coal gas, in order to equalise the quality, two benches then only being used, each bench was drawn half at a time and charged—the other half drawn and charged two or three hours after, according to circumstances. This plan had not been long worked before I discovered that the fuel was less than usual, and inferred that the cause was just what your correspondent L. T., states—a less sudden cooling of the setting. I need hardly tell you that I am working all the retorts in that way.

W. MANN.

City of London Gas Works, Jan. 16, 1856.

SIR,—In answer to a letter in your JOURNAL of the 8th ("A Suggestion for the Management of Retorts") I beg to say that L. T. is perfectly correct in his suggestion; for, in my long experience in the manufacture of gas, I never allowed more than two retorts in each oven to be open at one time. There are other advantages besides those mentioned which should not be overlooked—the comfort of the working man. The men can work with greater ease by not being exposed to so large a heated surface; neither are they in each other's way, as is the case where three, and I have seen four, men huddled together at one oven. The plan suggested I believe is still adopted at the works of the Imperial Gas Company; I can speak positively for their Fulham station. If some of these (*not little*) *matters* connected with the retort-house were looked into, the dividends of some of our gas companies would greatly improve.

London, Jan. 19, 1856. JOHN KIRKHAM.

INFLUENCE OF FOOD ON HEALTH.

SIR,—I have read your remarks on sanitary improvement with much pleasure, and particularly what you say about bad meat; and I know that you are right, because the same thing happened to me long since, when I lived in Yorkshire, where the whole village almost was nearly poisoned, about forty years ago. It happened through eating veal; and every body that eat that veal was dreadful ill with what you call cholera, though the veal was quite good and wholesome to look at; and so was the calf, for I saw it myself before it was killed, and I thought it a very fine one indeed. But everybody was very ill through it—even the doctor—and we were all frightened. So I am sure you are quite right, as I told several of my brother vestrymen; for only suppose the same had happened in this great town, London, then nobody would have been the wiser about the veal, and everybody would would have blamed the cholera. I will put my name and address below, but only for yourself, and not to publish it.

London, Jan. 15, 1856. A VESTRYMAN.

Register of New Patents.

1512.—THOMAS FELTON, of Edgbaston Street, Birmingham, in the co. of Warwick, glass chandelier and lustre manufacturer, for "*Improvements in glass reflectors for gas and other artificial lights.*" Provisional protection only obtained. Dated July 5, 1855.

This invention consists in producing reflecting surfaces by applying oxide of zinc or mercury on the upper surface; but in order that such coating shall not entirely obscure the light upwards, it is applied in strips or ribs radiating from the centre, or otherwise, thus leaving spaces uncovered for the passage of light which have little or no reflecting power, while the covered strips or parts reflect the light downwards. Coatings of calcined native earths, also, are applied as reflecting-surfaces to glass reflectors, using and applying earths according to the particular shade of colour of light required to be reflected.

1563.—EDWARD SIMONS, of Birmingham, in the co. of Warwick, for "*A new or improved instrument or apparatus to be used for condensing or absorbing the smoke and products of combustion arising from gas and other flames, and increasing the illuminating power of the said flames.*" Patent dated July 12, 1855.

This invention consists in an instrument or apparatus to be suspended or fixed over gas or other flames, in place of the ordinary bell-glass usually suspended over the said flames from the ceiling of the room.

It consists of a bell-shaped vessel suspended over the flame, with its mouth downwards; the lower edge of the vessel is turned inwards and upwards, so as to constitute an annular vessel at the bottom of the bell-shaped vessel. In the said annular vessel water is placed, or potash, or soda, or carbonate of potash, or carbonate of soda, or solutions of potash or soda, or carbonate of potash or soda; or there is placed in this annular vessel quick lime, or slacked quick lime, or any other absorbent of carbonic acid gas. Sometimes a series of holes is made near the bottom.

When the instrument or apparatus is placed over a gas or other flame, the current of heated air and products of combustion rising from the flame enter the bell mouth, and after rising up the middle of the vessel, descend into the annular vessel and pass out at the holes. As the current of air from the flame passes over the absorbent of carbonic acid contained in the annular vessel, the carbonic acid gas arising from the combustion is absorbed, or partially absorbed. Any smoke arising from the flame is also more or less condensed on the inner surface of the vessel, and on the matter contained in the vessel. The turned-up part of the bell-shaped vessel may be made a reflecting surface, and the illuminating power of the flame thereby increased.

The lower part of the vessel is sometimes constructed separately from the upper part, and attached by any convenient means.

The claim is for the new or improved instrument or apparatus herein described for condensing and absorbing the smoke and products of combustion arising from gas and other flames, and increasing the illuminating power of the said flames; that is to say, a bell-glass or other shaped vessel having at its lower end, or open mouth, an annular vessel containing any solid or liquid absorbent of carbonic acid gas, and provided, where it is deemed necessary, with a concave or convex reflector.

1617.—JAMES POLLARD, of the Woolwich Road, Bexley Heath, in the co. of Kent, for "*Improvements in the manufacture of gas.*" Provisional protection only obtained. Dated July 18, 1855.

This invention has for its object the use of peculiarly formed retorts and apparatus for making gas. For this purpose each retort is made with a return bend proceeding from the back end of the retort to the front end, such return bend being above the retort. The front end of the retort is made with an incline in a direction from front to back, and the front end is covered with a cover or lid, as is the case with other retorts; and the

front end of the return bend is also made to receive a cover or lid. In the return bend, or upper limb of the retort, are placed movable perforated partitions, which are from time to time drawn out to cleanse the retort. The rising pipe is applied to the front end of the upper limb of the retort. These retorts are peculiarly applicable when using oils or oleaginous matters made up into bricks or moulded limbs with absorbent materials.

PROVISIONAL PROTECTION

HAS BEEN GRANTED FOR THE UNDERMENTIONED INVENTIONS.

2624.—WILLIAM COOKE, of 49, Frederick Street, Gray's Inn Road, in the co. of Middlesex, C.E., for "*Improvements in gas and solar light reflectors.*" Nov. 21, 1855.

2797.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, and of Glasgow, N.B., gentleman, for "*An improved apparatus for discovering the leakage or escape of gas.*" Dec. 11, 1855.

2908.—DAVID DICK, engineer, of Paisley, in the co. of Renfrew, in Scotland, for "*A new and improved regulator for gas.*" Dec. 22, 1855.

6.—ALEXANDER COCHRANE, of 11, Eaton Terrace, St. John's Wood, in the co. of Middlesex, for "*Improvements in collecting and distributing water and alluvial deposits contained in sewage and other water.*" Jan. 1, 1856.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED PATENTS.

1979.—ALFRED VINCENT NEWTON, of 66, Chancery Lane, in the co. of of Middlesex, mechanical draughtsman, for "*Improvements in the manufacture of gas for illumination.*" Sept. 1, 1855.

2059.—ETIENNE CHARLES ZACHARIE BOUCHARD, C.E., of Paris, for "*Certain improvements in producing gas for lighting and heating.*" Sept. 11, 1855.

2071.—ABRAM LONGBOTTOM, of 41, Moorgate Street, in the City of London, and Soho Foundry, Leeds, for "*Improvements in the manufacture of gas when oils or fatty matters are used.*" Sept. 13, 1855.

2476.—FRANCIS HAWKES, the elder, surveyor, of West Street, in the parish of St. Lawrence, Reading, in the co. of Berks, for "*Improvements in the construction and arrangement of water-closet apparatus.*" Nov. 5, 1855.

2792.—JACQUES ELIDAT DE MALBEC, of Paris, and of 7, Duke Street, Adelphi, London, for "*Certain improvements in water-closets.*" Dec. 11, 1855.

2842.—PAUL MARIE SALOMON, of Rue Neuve, St. Eustache, JACQUES LOIR MONTGAZAN, of Rue de Bondy, and CHARLES MARIE JOSEPH DE FLEURS, of Rue Lafitte, all in Paris, for "*Improvements in the manufacture of gas from coals, and in the production of bituminous coke in that manufacture, and also in the apparatus connected therewith.*" Dec. 15, 1855.

2866.—EDWARD DAVIES and JOHN MILNE SYERS, both of Liverpool, in the co. of Lancaster, and CHARLES HUMPREY of Camberwell, in the co. of Surrey, merchants, for "*Improvements in distilling resinous, bituminous, fatty, and oily matters, and in the treatment of certain products therefrom.*" Dec. 18, 1855.

Legal Intelligence.

VICE-CHANCELLOR'S COURT.

SATURDAY, JAN. 12, 1856.

(Before Vice-Chancellor Sir J. STUART.)

SCOTT *v.* THE CORPORATION OF LIVERPOOL AND HAWKSLEY.

This case came before the court upon demurrer. The bill was filed against the corporation of Liverpool and their engineer, Mr. Hawksley, for an account of works executed by the plaintiffs for the corporation, and for payment of the amount due in respect of such works, the plaintiffs alleging that the accounts between themselves and the corporation were of too complicated a nature to be taken at common law. The bill set forth certain specifications, and a contract dated in January, 1852, under which the plaintiffs undertook and performed portions of the works for better supplying the borough of Liverpool with water by virtue of the provisions of the Liverpool Corporation Waterworks Act (1847), and other acts for the same purpose. The plaintiffs undertook by the contract to execute the before-mentioned works according to Mr. Hawksley's directions, and subject to his awards and certificates; and the contract expressly provided that the engineer of the corporation should not be made a party to, or be required to defend or answer, any bill or proceeding at law or in equity at the instance either of the plaintiffs or of the corporation; and that he should not be compellable to explain any matter relating to any certificate or award by him, or in what manner he settled or omitted to settle any matter between the plaintiffs and the corporation; and that if the engineer should be put to an expense by any such means, his expenses should be paid to him by the plaintiffs and the corporation jointly. The bill prayed for costs against the corporation, and Mr. Hawksley and the latter now demurred to the bill.

Mr. WIGRAM and Mr. HAWKINS appeared for Mr. Hawksley in support of the demurrer, and Mr. MALINS and Mr. KARSLAKE for the plaintiffs.

The VICE-CHANCELLOR, in delivering judgment, said: Mr. Malins, I will not trouble you in this case. The plaintiffs, who are contractors, and who executed certain works for the corporation of Liverpool, complain that they have executed those works, for which they have not obtained payment; and they therefore make defendants not only the Corporation of Liverpool, but Mr. Hawksley the engineer, whose name is mentioned in the contract, and who has important duties to perform under the contract; and they complain of Mr. Hawksley fraudulently withholding from them, the plaintiffs, the means of recovering payment for the works they have executed. Bills of this kind, in which an engineer is made a defendant, and in which improper conduct is alleged against him, and relief sought upon the footing of that improper conduct, have of late years not been unusual in this court; and I conceive there is just ground for equitable jurisdiction, and for maintaining a bill for equitable relief, not only against the parties to the contract who are bound to pay, but against the engineer himself, where there are allegations upon the bill with reference to the conduct of the engineer, which show that conduct to be inequitable and improper. In the present case, I think the allegations in the eleventh and twelfth paragraphs of the bill, as to the conduct of the engineer, are allegations of unjust and improper conduct. Their first allegation is, that he has wilfully refused to certify that certain works have been done, so as to enable the plaintiff to recover payment. The next allegation against them is, that being constituted an arbitrator by the terms of the contract, he has declined to execute those functions; therefore there are acts and omissions alleged as against this engineer which are of an inequitable and improper character. Some difficulty, no doubt, has been created by a singular allegation towards the end of the bill, with reference to the sense in which the word "fraud" is used in the bill; but I can only understand that allegation, which seems to me to be quite superfluous and improper, as introduced from a sort of tenderness of feeling towards this gentleman, whose feelings were intended not to be hurt, although the plaintiffs have alleged in their charge against him arbitrary and improper conduct. But the defendant, the engineer, being thus brought before the court, has demurred, and has supported his demurrer by reference to the terms of the contract, as well as to the doctrines of this court. There is in this contract a stipulation which directly and positively would exclude the jurisdiction of any court with reference to any conduct of this engineer, however fraudulent and improper. Nobody who has had occasion to look much at the terms of the contracts which are now entered into between contractors and great public bodies for whom works are to be executed, need be much surprised at the extraordinary stipulations in these contracts. This is a stipulafion of an extraordinary and improper kind, if it bears the construction that is contended for by the plaintiffs. The contract is express, that the engineer shall not be liable to any proceeding against him at law or in equity, by reason of any conduct on his part, which in ordinary circumstances would make him liable to the suit of the other contracting parties. I allude to the stipulation at the end of page 9 in the printed copy of the bill, where it is stipulated "that it shall not be competent for the said contractor or the said corporation to except in law or in equity to any hearing or determination before or of the said engineer, or to any certificate, order, or award had, proposed, made, or executed by such engineer on the ground of any want of jurisdiction, or excess of authority, or irregularity of proceeding, or otherwise howsoever." Now, I can only say that, with reference to any stipulation of that kind, I conceive it to be highly improper; and I shall not in any case in which improper conduct, or fraudulent conduct, or inequitable conduct on the part of the individual in whose favour a stipulation of this kind is made, treat it otherwise than as waste paper; at the same time, stipulations of this kind are liable to this observation, that if a suit were instituted against him, and if in the progress of the litigation the plaintiff thought fit to release him from the consequences of his fraudulent and improper conduct, it may be said (and I thought it would have been argued) that a stipulation of this kind only amounts to a release *ab ante*; for, it might be said—and that observation has always occurred to my mind as referred to stipulations of this kind—that whether a man, before or after improper conduct, agrees to release the person guilty of it, the effect may be considered to be the same; but I do not understand that to be the law of contracts, because a release executed from all the consequences of fraudulent conduct after that conduct has been committed, is a contract to release a person the exact nature of whose conduct is fully ascertained and known; but to say that before-hand a licence shall be given by one man to another to commit any sort of fraud or dishonesty against him with impunity, and without question in a court of law or equity, cannot, I think, be treated upon the footing of having the validity as a release *ab ante*, but must, when the conduct is complained of, be treated as a mere nugatory stipulation, to which courts are bound, when they find improper conduct alleged, not to give effect. The demurrer was supported by reference also to the form of the prayer of the bill; and there was considerable force in the argument urged by the counsel for the defendants, when they say, that, looking at the prayer of the bill, no active relief is prayed against this engineer. And, although he is brought before the court as a defendant, he is not asked to pay anything; and he, upon the strict construction of the prayer of the bill, is not even asked to pay the costs of the suit. That is very true; but if the plaintiff be entitled to equitable relief against the corporation upon the facts stated in the bill, and comes to ask for that relief in the absence of the engineer, the first part of the prayer of the bill would be a prayer for a declaration, in the absence of the engineer, that he had acted fraudulently and improperly. Now, I apprehend that under such circumstances the person against whom a bill alleges active conduct, or fraudulent omission, is a proper party, where the court is asked to declare that there has been improper, or fraudulent, or inequitable conduct with reference to his acts or omissions. Therefore, looking at this, that by circuity the frame of the bill ought to have been that he be compelled to grant the certificate, which is the document by force of which, even at law, the plaintiff might recover his demand, although the circuity of praying that he may be ordered to grant the certificate is very properly omitted; yet my opinion is, that the person by whose misconduct the plaintiff is prevented from recovering against the co-defendants that which he is justly entitled to, is in this case properly made a party to the suit. My opinion, therefore, being that, upon the allegations in this bill, if proved at the hearing, the plaintiff would be entitled to relief as against this gentleman, and to a declaration that his conduct has been improper. It is unnecessary to consider the other point which has been argued, which is merely for the purpose of discovering whether he could be made properly a party; it is quite enough that I find a case alleged which seems to me to justify the relief prayed against this defendant, and therefore I must overrule the demurrer.

Mr. MALINS: Upon the usual terms?

Mr. WIGRAM: Will your Honour allow the costs of the demurrer to be costs in the cause? If it should turn out that the plaintiff gets nothing by the suit, I should think it would be a very fair case in which Mr. Hawksley should try to diminish the expense of the demurrer.

The VICE-CHANCELLOR: I can do nothing of that kind.

Mr. KARSLAKE: Perhaps your Honour will allow me to say, in defence of my bill, that I copied it, word for word, out of Lord Cottenham's judgment, from the case of MacIntosh *v.* the Great Western Railway Company—of course, it was not quite necessary for me to do so.

The VICE-CHANCELLOR: But it is a new sort of pleading to copy the observations of any judge in a judgment, and make it part of the pleadings in the cause.

Mr. WIGRAM: In order to prevent the bill being demurred to, whether it was true in fact or not.

Mr. MALINS: I dare say, when we get Mr. Hawksley's answer, we may be able to remove the qualification.

Mr. HAWKINS: We must ask for time to answer.

Mr. MALINS: I believe this demurrer was put in merely for the purpose of gaining the Christmas vacation; therefore, I hope your Honour will allow the time for putting in their answer to be as short as possible.

The VICE-CHANCELLOR: How long do you ask for, Mr. Hawkins?

Mr. HAWKINS: I should ask for two months, otherwise we should only have to apply again for an extension of time.

Mr. MALINS: I hope your Honour will consider one month quite sufficient.

Mr. HAWKINS: We must apply to the court for further time—we cannot go to chambers for that purpose.

The VICE-CHANCELLOR: I do not think I can refuse six weeks in a case of this kind. I know what the result of a month will be; I shall have another application made to me for a further extension of the time.

Ultimately it was ordered that six weeks should be allowed for answering the bill.

COURT OF QUEEN'S BENCH,

SATURDAY, JAN. 12, 1856.

(Sittings in *Banco*.)

THE QUEEN *v.* THE CORPORATION OF HALIFAX.

In this case a rule had been granted calling upon the corporation of Halifax, acting as the local Board of Health, under the Public Health Act, 1848, to show cause why a *mandamus* should not issue commanding them to make compensation to the prosecutor, William M'Vine, for certain damage done to his cellar by the overflowing of a sewer constructed by the corporation.

Mr. ATHERTON and Mr. MILWARD now showed cause against the rule, on the ground, first, that there had been no sufficient demand and refusal; and, secondly, that the corporation disputed their liability, and the case was not one for a *mandamus*.

Lord CAMPBELL suggested that the facts should be found by some impartial person, and stated in the form of a special case for the opinion of this court.

Mr. ATHERTON said he had no power to consent to such an arrangement, and contended that the prosecutor ought to proceed by action.

Lord CAMPBELL said that, if the corporation were acting within their powers, there would be no right of action. The rule was *in ipsissimis verbis* with the 144th section of the act.

After some further discussion, the court, without calling on Mr. Watson to support the rule, made it absolute.

Lord CAMPBELL said, he could not refrain from saying that he thought this Board of Health were behaving in a manner not creditable to them. The act of Parliament, if carried out, would be of great benefit to the community; but if it was perverted, no benefit could result from it to the the inhabitants of the district; the rule for the *mandamus* to make compensation must be made absolute, for the prosecutor was entitled to that. But it was to be deplored that what the court recommended the counsel for, the board were forbidden to accede to. It seemed as if the board wished that litigation should go on, whereby the funds of the body would be wasted.

Mr. ATHERTON then applied that the writ might be stayed for two days, in order that, after his lordship's expression of opinion, he might have an opportunity of communicating with the board.

Lord CAMPBELL said that might be done, and he should be glad to hear that the board had come to their right mind.

Miscellaneous News.

THE METROPOLITAN BOARD OF WORKS.

MONDAY, JAN. 7.

This day, at twelve o'clock, the Metropolitan Board of Works met again in Burlington House, Piccadilly, for the transaction of business. Mr. THWAITES, the president, occupied the chair. There was a full attendance of the members of the board, and the space assigned in the apartment for the accomodation of the public was again crowded, as on previous occasions. It should be stated that the board, though now fully constituted and in working order, are scarcely yet in a position to grapple with the more important public functions which devolve upon them under the act of Parliament by which they are incorporated. The appointment of a multifarious staff of officers for carrying out their requisitions, and a vast number of other arrangements consequent upon the sudden transfer to them under the statute of the duties and obligations—some of them of great public urgency—of the Metropolitan Commission of Sewers, now defunct, demand their immediate attention at present, and will probably occupy it for some little time to come.

The minutes of the preceding meeting were read by Mr. JOSIAH WILKINSON, the acting honorary secretary, and confirmed.

NEW MEMBERS.

The PRESIDENT reported that Mr. A. R. Bristowe, of Greenwich, and Mr. Charles Harris, of High Street, Southwark, two highly respectable gentleman, had been returned as members of the board—the former for Greenwich, and the latter for St. Saviour's, Southwark—in the room of himself, he having, on his election as president, vacated his seat for those places.

Mr. Bristowe and Mr. Harris delivered in the certificates of their election, and took their seats at the board.

On the motion of Mr. DREW, it was carried by a majority of two that each member be requested to forward to the president of the board the certificate of his election, signed by the chairman of the district meeting at which he was elected—Mr. LOWMAN TAYLOR protesting that now, when the board was holding its fourth meeting, it was a positive loss of time to entertain such a proposition.

PROVISIONAL MEASURES.

The HONORARY SECRETARY read a report from the president, made in accordance with a resolution passed by the board at their last meeting, relating the preliminary arrangements which he had since adopted for carrying on the current business of the board. It stated that instructions had been given to the chief of the rating department, the collectors, and bailiff of the late Commission of Sewers to continue the collection of the rates now in hand, and pay in the proceeds to the account of the provisional treasurer with the London and Westminster Bank. Messrs. Smith, the solicitors to the late commission, had reported the present state of all legal proceedings in which that commission was concerned, from which it did not appear that there were any requiring immediate action. Instruction had been given to the district engineers of the late commission to report the present state of all the works in their several districts, the various existing contracts, the amounts already expended upon them, the probable sums required to complete them, and the probable term of completion; the staff of clerks of works required to superintend them, and any other particulars they might think necessary to convey a just idea of the position of the board in relation to the several contractors. The accountant of the late commission had been instructed to prepare a report on the arrears of business in his department, and the staff required satisfactorily to complete it. A provisional staff, to carry on the current business of the board, had been selected from the officers of the late commission, to superintend which it had been necessary to appoint a gentleman having a knowledge of architecture and engineering, together with experience in the practical details of the late commission, and at the same time possessing the entire confidence of the president. The district engineers had been authorised to engage temporarily the clerks and other persons who had heretofore assisted them. Every officer whose services had been retained had been clearly given to understand that his engagement was provisional, and existed only during the pleasure of the board. It suggestad that arrangements should be made, for the present, for continuing the payment of the weekly salaries of those officers whose salaries had been hitherto paid in that way; that motions intended to be moved at any meeting of the board should be sent to the president one week before such meeting; and that a small committee should be appointed to examine and verify the muniments and documents handed over to the board by the late commission. It also recommended the appointment of committees of finance, of conference with district boards, of appeals, for preparing a code of bye-laws, and for purposes connected with the Metropolitan Buildings Act.

Mr. Deputy HARRISON said, if the board were to be asked to adopt that report of the president in its entirety, he was not prepared to accede to all the suggestions it contained. He would mention one with which he entirely disagreed. The board, at a previous meeting, agreed to appoint temporarily an engineer-in-chief, and to confide to him the execution and superintendence of all the works the management of which devolved on the board by the act of Parliament by which they were incorporated; but now, he understood from the report just read, the president had appointed several persons to do the very work the whole responsibility of which the board had previously devolved upon Mr. Bazalgette, the engineer-in-chief. (Hear, hear.) He asked the president whether he (Mr. Harrison) was right in the interpretation he had put upon that part of the report.

The PRESIDENT said his friend would have better understood the question if he had heard the whole case. The board having delegated to him (the president) certain powers, it was necessary that he should render an account of the exercise of them. He had asked for no power to transact any of the business of the board, except such as was of a strictly provisional nature, until the staff of the board was organised, and so that in the meantime the public service should not suffer. (Hear.) In reply to the question as to whether he had trespassed upon the authority given to the chief engineer, he would state, for the information of Mr. Deputy Harrison and of the board, that Mr. Bazalgette, the chief engineer, had applied to him (the president), feeling that the terms of his temporary appointment by the board were not sufficient to enable him to call on the clerks of works and district engineers to discharge the duties which the board had devolved on them, and asked him for authority to avail himself of the services of those officers. He (the president), under these circumstances, had felt no hesitation in giving Mr. Bazalgette the authority which he required. (Hear.) He had not further interfered in the matter, and he had only interfered so far on the suggestion of Mr. Bazalgette himself. (Hear.)

Mr. Duputy HARRISON said he was perfectly satisfied with the explanation the president had given, and with the course he had adopted with reference to the engineer-in-chief.

Mr. D'IFFANGER moved that the report of the president be received and adopted.

Mr. LOWMAN TAYLOR said, the report might be one which they could unanimously adopt; but before he agreed to its adoption as a whole, he should like to consider some of the recommendations contained in it. No harm would be done if the report was printed and sent to each member of the board before they were called on to adopt it. (Hear.)

Mr. TAYLOR made a motion to that effect, but it was not seconded; and a motion of Mr. WARE, that the report be simply received, was agreed to. A resolution moved by Mr. TURNER, that the measures taken by the president under the authority of the board be approved, was also passed.

Major LYON moved that the report be printed, contending that it was desirable in this and all future cases that reports made to the board be received and printed, but not discussed on the day on which they were brought up.

At the suggestion of Mr. WILKINSON, that the recommendations in the report were not of a nature to justify its being printed, Major Lyon withdrew his motion. The recommendations were then considered *seriatim*, and agreed to, with modifications in some cases, after a conversation among the members.

REPORTS OF OFFICERS.

The HONORARY SECRETARY, at the request of the president, read the following report of Mr. Bazalgette, the temporary engineer-in-chief to the board:—

To the Metropolitan Board of Works, No. 1, Greek-Street, Soho, Jan. 5, 1856.

Gentlemen,—By a vote of your honourable board of the 1st instant, it was resolved,—

"That, in order to prevent the injurious consequences to the public which might result from any interruption in the supervision of sewers, Mr. Bazalgette be requested to take charge of all main sewers and other works the management of which, under the act, devolves upon this board, with power to obtain such temporary assistance as may be necessary to such duty until the board otherwise direct."

In pursuance of the foregoing instructions, I now beg to submit the following short statement as to the nature and extent of the works the management of which devolves upon the board, and of the temporary arrangements which I have felt called upon to make to carry on those works, trusting that they will meet with your approval.

Under the act of Parliament, you have the direct management and control over 166 miles of main lines of sewers, partly covered, and partly open; viz., 106 miles on the north side of the Thames, and 60 miles on the south.

You have also 27 contracts for new sewers, now in course of construction, transferred to your control; mainly collateral or district sewers, in about 200 different roads and streets extending all over the metropolis.

These contract works will be completed at periods ranging from a fortnight to six months hence; but the pavements, gas, and water mains over them, will afterwards require attending, and the contracts cannot be finally settled and disposed of until six months after the completion of the sewers.

To superintend the above sewers, and carry on the works, I have retained the services of 33 assistants, including clerk of works and flushing inspectors, for such time, and upon such conditions, as may hereafter be sanctioned by the Metropolitan Board of Works. These assistants will from time to time be reduced in number as the contract works are completed.

Mr. Haywood, for the present, continues the charge of those portions of main sewers which pass through the City.

For more detailed information, I submit herewith appendices arranged in tabulated forms, so as to give at one view all the important particulars respecting the various works in hand, and the temporary arrangements made for their supervision, together with a list of the names and duties of the officers temporarily retained by me in the discharge of this duty.

I have the honour to be, gentlemen, your obedient servant,

J. W. BAZALGETTE.

On the motion of Mr. CHALMERS the report was received.

Mr. THOMAS COGGIN, the clerk of the rates, reported that the total amount of the rates in the several districts was £241,678. 3s. 2d., of which there had been collected and paid in to the treasurer, up to the 31st of December, 1855, £184,342. 14s. 1d., leaving £57,335. 9s. 1d.; to recover which it would be necessary to issue about 25,000 summonses and about 15,000 warrants. (A laugh.)

The report was received and adopted, and temporary arrangements were sanctioned for continuing the collection of the rates and the payment of the collectors.

The accountant reported that the shortest possible time during which the accounts of the late commission, in his department, could be completed was a month, and the cost would be about £66. The report was received and adopted.

THE DEVICE ON THE COMMON SEAL OF THE BOARD.

The report of the committee appointed at the last meeting, to consider and report upon an appropriate device for the common seal of the board, was brought up and read. They recommended that there should be two seals; first, a large one, with which to seal all the deeds and official documents emanating from the board; and a smaller one, to be used in their official correspondence: that on the large seal should be engraven the Royal Arms, surrounded by the armorial bearings of the four metropolitan counties of Middlesex, Surrey, Essex, and Kent, and of the cities of London and Westminster, with the inscription, "The Metropolitan Board of Works;" and that the smaller one should be engraved with the arms of the four metropolitan counties only, and a similar inscription.

Mr. LOWMAN TAYLOR, seconded by Mr. DALTON, moved the adoption of the report of the committee.

Mr. TURNER said, he considered it important that they should have a motto on their common seal indicative of the principle under which they were embodied, and of those on which they were going to act, and by which they would be admonished whenever they were disposed to depart from those principles. They were constituted on the principle of popular election in the first place, and in the second, to carry out in good order that which had heretofore been carried on in an unsatisfactory and desultory way. The result aimed at was strength. He would move, "That the motto on the seal be, 'Liberty, order, and strength.'" (A laugh, and "Oh, ho!")

The motion was not seconded.

Major LYON moved, as an amendment, "That they should adopt the recommendation of the committee with respect to the large seal, without troubling themselves with any such motto as 'Liberty, equality, and fraternity.'" (A laugh.)

Mr. LOWMAN TAYLOR protested against the unnecessary waste of their time by such a discussion. The committee had hit upon a very suitable device, in recommending that the arms of the counties and cities over which the Board of Works had jurisdiction should be quartered on their common seal; and let the board adopt that recommendation at once.

The amendment of Major Lyon was put and lost; and the motion of Mr. Taylor, adopting the report of the committee, was carried.

On the motion of Mr. SAVAGE, seconded by Mr. WARE, it was resolved that there be but one device on both seals.

At this point a letter was read by the PRESIDENT from Mr. Wyon, the engraver, enclosing two rough sketches of a device for the seal. In one he stated he had sought to represent "the Metropolis in consultation with Science. The figure intended to personify the Metropolis, including the adjacent districts, had by her side a shield, on which the arms of the cities and counties of the district over which her jurisdiction extended were depicted; and the figure of Science submitted for consideration a plan of some works, the wheel, pickaxe, &c., denoting that it was engineering science that was intended." In the other sketch he stated that he had sought to treat the subject heraldically. He added, that he found on inquiry that the counties of Surrey and Essex had no armorial bearings—(a laugh)—but those of Guildford and Colchester, their chief towns, might be used.

Mr. SEELEY moved, "That, inasmuch as Mr. Wyon had thrown new light on the subject, in reference to there being no armorial bearings for Surrey and Essex, the question be remitted back to the committee for reconsideration."

The motion was seconded by Mr. L. TAYLOR, and carrried.

DUTIES AND SALARIES OF OFFICERS.

The report of the committee appointed at the last meeting to consider and report upon the duties and salaries of the engineer-in-chief, the clerk or secretary, the treasurer, accountant, and superintending architect, was next read. It described in detail, except in the case of the architect, the duties of the several officers, and recommended, with some exceptions, that they should be required to devote their whole time and attention to the services of the board; that the clerk's salary should be £800 a year; but that with regard to the salaries of the engineer-in-chief, the accountant, and superintending architect, they required further time for consideration. They also recommended that one of the joint-stock banks carrying on business in the metropolis be appointed treasurer, and that the committee should be authorised to communicate with the several joint-stock banks, to ascertain the terms on which they would be disposed to accept the office.

The PRESIDENT, in reply to Major Lyon, said the clerk would be required to advise the board on all legal points arising during their discussions, whenever necessary; but they would appoint a solicitor, to whom they would refer in all cases of legal difficulty.

THE CLERK'S SALARY.

Mr. Deputy HARRISON said, as to the clerk to the board, the committee, of whom he was one, gave the subject a great deal of consideration, and it was in the minds of all of them that the gentleman appointed to that office should be one whose mind had received a legal training, although they did not say whether he should be a barrister or a solicitor. There would be constantly questions arising before the board as to the construction of the acts of Parliament under which they would operate, and it was very material that they should have a gentleman on the right of the president who would be able generally to advise him and the board on all such occasions. That was the view the committee took; and they found also that there was scarcely an instance in which a law man had not been appointed to discharge similar duties. As to the salary of £800, the committee did not desire to establish this appointment at an unnecessarily large annual remuneration. They knew that £800 had secured the services of the gentleman who had acted as secretary to the late commission, and they thought it would remunerate the gentleman who should be appointed the clerk of this board for the duties he would have to discharge. (Hear.) They did not, therefore, feel themselves justified in giving a larger salary than was given by the commission which had been superseded by the present board. The committee had unanimously agreed to that recommendation, and he moved that the board would agree to their recommendation.

Mr. HOWS reminded Mr. Deputy Harrison that the secretary to the Commission of Sewers had £100 added to his salary, in consideration of relinquishing some of his apartments for the use of the commission.

Mr. HARRISON believed that was so.

The PRESIDENT, in answer to Mr. Davies, said the clerk would have no power to appoint his subordinate officers. They would be appointed by the board.

Mr. DAVIS was sorry to hear it, inasmuch as a deal of their valuable time would be thereby frittered away.

The motion, adopting the recommendation that the clerk's salary be £800, was then agreed to, as were also the other recommendations of the committee *seriatim*, after a short conversation.

Mr. LOWMAN TAYLOR urged upon the board to appoint the clerk with the least possible delay.

NEW BUILDINGS AND STREETS.

Major LYON moved. "That it be a regulation to be observed forthwith in the erection of new buildings and streets, that no street shall be constructed of a less width than 40 feet, and no alley of a less width than 10 feet." He explained, that he had reason to apprehend that in several parts of the metropolis buildings and streets were being erected in a manner which would be detrimental to the health of the inhabitants, and the builders were pressing them forward, during the present transition state of the executive body and the law, in the hope that they would not afterwards be called on to alter their plans.

The motion was seconded by Mr. CHALMERS.

Mr. COLLINSON objected to an abstract proposition like that being entertained by the board at present, and moved that the question be referred to the committee on bye-laws.

A short discussion ensued, in which Mr. HOWS, Mr. Deputy HARRISON, and other members took part, and which resulted in the motion of Major Lyon being lost, and in his giving notice that he would renew it at the next meeting.

Mr. DIXON hoped it would go forth to the world, for the information of persons building houses in contravention of the law, that this board had extensive powers to remove nuisances of all kinds, and that they would exercise them in all such cases. (Hear, hear.)

ELECTION OF CLERK TO THE BOARD.

On the motion of Mr. L. TAYLOR, seconded by Mr. DOULTON, it was resolved that the board, at its rising, adjourn to Monday next, at twelve o'clock, and then proceed with the election of the secretary or clerk to the board; and,

On the motion of Mr. COLLINSON, an advertisement was directed to be inserted in the daily papers, setting forth the duties and salary of the clerk, and the time up to which applications would be received by the board from gentlemen desirous of becoming candidates for the office.

A conversation, originated by Mr. HAWKES, then took place with reference to the place of meeting of the board after the 21st inst., when Burlington House would be required for the use of the Government, in which the PRESIDENT, Mr. NICHOLAY, Major LYON, and Mr. DAVIS joined; the latter gentleman, who represents the district of Plumstead, causing some laughter by saying there was a handsome room on Plumstead Common which might be at the service of the board.

A short discussion also arose on the motion of Mr. D'IFFANGER, to refer the consideration of the applications for the clerkship to a committee, to meet on Saturday, with power to reduce the number of applicants to six, to whom the choice of the board should ultimately be limited.

Several members, including Mr. COLLINSON and others, objected to the proposition, as tending to abrogate the main functions of the board in so important a matter as the choice of their clerk, and it was negatived on a show of hands.

The board then adjourned.

MONDAY, JANUARY 14.

The board met this day at Burlington House, at twelve o'clock, to elect a clerk to the board; to receive a report of the committee appointed to consider the common seal; to receive further report of committees on salaries and duties of officers; and to take into consideration the appointment of the following committees:—To hear and determine appeals; for financial purposes; to confer with vestries and district boards; to report on duties of the board under the building act; and to examine and report on claims for compensation. Also, to consider the following motions of which notice had been given at the previous meeting:—By Mr. Hawkes: "That the question of a place of meeting of this board, until a permanent arrangement be made, be referred to the committee of seven already appointed to consider offices, with a recommendation to select a convenient room as near as possible to the offices in Greek Street."—By Major Lyon: "That no street be allowed to be of less width than 40 feet, and no alley of less width than 20 feet."

Mr. JOHN THWAITES occupied the chair.

Mr. Drew, at the request of the President, acted as honorary secretary, in the absence of Mr. Wilkinson, who was a candidate for the office of permanent clerk to the board.

The minutes of the last meeting having been read,

Mr. LOWMAN TAYLOR inquired if they had been signed by two members of the board, as the act of Parliament required. He did not think that the signature of the president and that of another person would satisfy the requirements of the act, as the president was not a member of the board.

The PRESIDENT said, the act was quite clear upon that point. The president was a member of the board.

The minutes were then confirmed.

The PRESIDENT then introduced Mr. Bidgood to the board as the elected representative of St. James's parish, in the room of Sir J. Shelley, M.P., who resigned.

Mr. L. TAYLOR brought up the report of the committee appointed to consider the common seal. He stated that the expense of the two seals—the

large one for official, and the small one for ordinary, purposes—would be only 30 guineas.

The report was received and adopted.

SALARIES OF THE ENGINEER AND ACCOUNTANT.

The report on the salaries of the engineer and accountant was then read. It recommended that the engineer be paid £1000 a year, including travelling and incidental expenses; and that the accountant be paid £450, including incidental expenses. The committee required further time to consider the salaries of the other officers.

Mr. CARPMAEL moved, "That the report be adopted."

Mr. D'IFFANGER asked Mr. Carpmael, who was the only engineer at the board, whether he thought £1000 was a sufficient salary for an engineer.

Mr. CARPMAEL said it was not; but, as the committee had carefully considered the subject, he had waived his opinion in deference to theirs.

Mr. HOWS, in seconding the motion, said the committee had had two meetings on the subject, which was very fully discussed. They were desirous of avoiding parsimony on the one hand, and extravagance on the other. He thought that, in fixing the salary at £1000, they had steered a proper course between the two extremes—they had attained to the happy medium. They were most anxious to avoid a lavish expenditure of the public money.

Mr. D'IFFANGER said he was very far from being desirous of lavishing the public money, but he felt it his duty to move, "That the salary be £1200; that was, £1000 for salary, and £200 for travelling expenses." The engineer of the City, who had only one square mile to travel over, was paid £1200; and he thought the engineer of the board, who would have 100 square miles to travel over, should have at least as large a salary as the engineer of the City. The success of all their undertakings would mainly depend on the efficiency of the engineer, and it was most essential that they should have one of the highest attainments, and such a person could not be found for £1000 a year. It was a false economy to have a second-rate man, and would peril the success of all their undertakings. He would therefore move, "That the salary be £1200."

Mr. SNOW deemed it of the greatest importance to have a first-rate engineer. The works they would have to carry out would be of an extraordinary character, and £300 or £400 a year additional would be well expended in procuring the services of an eminent man. He did not think any man of high standing in his profession would accept the situation at £1000 a year. He (Mr. Snow) would therefore second the amendment.

Mr. NICHOLAY said the committee appointed to consider the question consisted of 15 gentlemen, who occupied a considerable time at three sittings in deliberating on the matter, and he trusted their unanimous decision would be confirmed. They should bear in mind that a vast portion of the engineering work was removed from the board to the districts. Henceforth every parish would have the management of their own sewers. The principal work the engineer of the board would have to carry out would be the main sewerage of the metropolis. He did not think the additional £200 a year would be any inducement to first-rate men who were earning £5000 or £6000 a year. He did not think it good policy to begin with too high a salary. It would be easy for them to increase the salary, but difficult to diminish it. They should, in this respect, follow the same course they had adopted with reference to the president's salary—they should begin with a minimum.

Mr. BURSLEM supported the amendment.

Mr. OFFOR said some of the committee were of opinion that the salary should be only £800. Mr. Carpmael thought it should be £1200, but he had deferred to the general opinion of the committee, who had adopted the medium sum; and he (Mr. Offor) thought the conclusion they had come to was a right one.

Mr. DOULTON said the drainage of the metropolis was not a simple matter It had puzzled all former engineers, and it was, therefore, most desirable tha a first-rate man should be obtained. The old board paid their engineer £800; but there were two consulting engineers, who on one occasion were paid £1000 for their report. The previous engineer had £1500 a year. The City of London had an engineer whose abilities they rated at £1200, and it appeared to him that the engineer for the whole metropolis should have at least as large a salary. It would be derogatory to the board to advertise for an engineer whose abilities were estimated at so low a sum as £1000 a year. Liverpool, Manchester, and Birmingham gave much higher salaries; and Mr. Carpmael, whose opinion was of some value, had given a decided opinion that the engineer ought to have £1200 or £1500 a year.

Mr. HARRISON said, the City of London engineer received £1200 because he had served them well and faithfully for eleven years. Two years ago his salary was only £800, but they appreciated his ability so much that they raised the salary to £1200. He had a great deal to do which would not be required of the engineer of the board. The City engineer was the architect and adviser of the commission on all questions of paving, sewerage, and improvements. He (Mr. Harrison) thought the board could find a man of requisite ability for £1000 a year, and he would therefore support the recommendation of the committee.

The amendment was then put to the board and lost, and the recommendation of the committee confirmed.

The recommendation respecting the salary of the accountant was also approved of, and the report adopted.

DOCUMENTS OF THE LATE COMMISSION.

It was then reported to the board that the documents belonging to the late Commissioners of Sewers had been duly taken possession of.

The PRESIDENT said, those documents which were of great value to the board were in a very insecure place at present. The box containing them was not fire-proof, and could be easily moved off the premises. He would recommend that a box, with the name of the metropolitan board upon it, be provided, and that, in the meantime, the box be deposited with their bankers. The documents were at present in his possession, and he felt concerned for their safety, especially as one of the keys of the box was lost some years ago, and if some antiquarian got possession of it, he (Mr. Thwaites) might be placed in an awkward position. (Laughter.)

Mr. FEW moved, "That the recommendation of the president be carried into effect."

Mr. L. TAYLOR suggested that it would be better not to provide a fire proof box until they had first determined on what sort of a building they were to occupy. At present it would be quite sufficient to place them in a japan box, and deposit them with their bankers.

Agreed to.

FUTURE OFFICES OF THE BOARD.

Major LYON then brought up the report of the committee appointed to select a place for the future meetings of the board. The report recommended that the board should occupy their own premises in Greek Street, Soho, and that such alterations and additions be made in them as might be deemed necessary.

On the motion "That the report be adopted,"

Mr. DOULTON said the committee had thought of taking a house at Charing Cross, but there were so many difficulties in the way, that they ultimately determined on occupying their own freehold in Greek Street. There was a large yard connected with the premises, on which a board-room could be built, and other arrangements might be made for the accommodation of clerks and officers.

Mr. SEELEY said, it was a matter of indifference to him where they held their meetings, as he lived in a central part of London; but they ought, if possible, to obtain a position which would be most convenient for all the members of the board. He could not go into any society without hearing that the board would never work, because they could never get gentlemen to attend the meetings regularly if they had to travel three or four miles to them. That being the case, there could be nothing plainer than the propriety of finding a place which would be the centre of the circle with respect to the localities represented at the board. He thought that centre would be somewhere about the Royal Exchange. If they went to Greek Street, the result would be that all the gentlemen at the East End would have to make a journey of 2½ miles both ways, which would be 5 miles; and if there were two attendances per week, each member would have to travel 500 miles a year. (Laughter.) On looking over the list of members, he found that 30 of them resided on the east side of Temple Bar. That being the case, he thought, if they decided on having their future offices in Greek Street, they would be decidedly in error. He did not say that the committee had not decided honestly, but he thought there was an error even in the appointment of the committee, for six of those gentlemen resided in the West End of London. Those gentlemen very naturally thought that Charing Cross was the centre of the universe. They went down there from Greek Street to look for premises, and, not finding what they wanted, they returned to Greek Street, as if there were no places in the world but Greek Street and Charing Cross. (Laughter.) He would move, "That a committee be appointed to ascertain the most central position, for the convenience of members, at which premises could be had for the future meetings of the board."

Mr. DIXON, on seconding the motion, said it would be better to give away the freehold in Greek Street, than endeavour to make it a fit place for their meetings.

Mr. DAVIS thought the matter should be referred to a committee. He objected strongly to laying out one guinea on the Greek Street premises; he thought the situation unhealthy and inconvenient.

Mr. SEELEY observed, that if the resolution were adopted, he would move that the committee be enlarged.

Mr. HAWKES protested against laying out £25,000 or £30,000 on new premises; and, in addition, to sacrifice a valuable property in Greek Street, which was quite sufficient for all the purposes required. By a trifling outlay, the Greek Street premises might be rendered every way suitable.

Mr. HALL said, the premises in Greek Street would be worth £3000 or £4000 a year any where else; and it would be a great pity to sacrifice so excellent a property. There was a vacant piece of ground on which a large board-room might be erected.

Mr. COLLINSON said it was impossible to find a place of meeting that would not be inconvenient to some of the members. As Greek Street was only ten minutes' walk from Charing Cross—a central part of the metropolis—he would support the recommendation of the committee.

Mr. SNOW said he would decidedly put his veto on Greek Street; the place was not only inconvenient to the members of the board, but also to the public. Besides, although all the members were now in London, where would they be in summer? Many of them would be at the sea side, perhaps; and therefore it was important that the place of meeting should be at a convenient distance from a railway station. He would move, "That the report be referred back, and that some gentleman, east of Temple Bar, be added to the committee."

Mr. HUNT did not know any place so suitable for the purposes of the board as Greek Street. The rooms might be easily warmed and ventilated, and the house itself was substantially built. By going to Greek Street they would save the ratepayers £20,000. As a practical surveyor, he would cordially support the report.

Mr. CRELLIN supported the amendment.

Major LYON supported the report of the committee, and reminded the board that it was a question affecting the money of the ratepayers. (Hear, hear.) He thought the report ought to be adopted, and the committee instructed to prepare plans of what was necessary to be done in Greek Street, and report to the board on these repairs on another occasion.

The PRESIDENT then put the amendment of Mr. Seely, which was negatived.

Mr. ORR next moved, "That five gentlemen be added to the committee, that they be instructed to reconsider the report."

An HON. MEMBER considered the amendment now put a factious amendment, for it was precisely the same as that already negatived.

The PRESIDENT hoped that members of the board would act courteously towards each other, and not use strong language. It was for him to decide whether the amendment was or was not a proper one, and he had already declared it was a legitimate amendment.

Major LYON said, he had no objection to the addition of five members to the committee, but he did object to have the same matter referred to the tribunal which had already decided on its merits.

The question was then put, when the amendment was lost—the numbers being 15 and 24. Five members were, however, added to the committee, agreeably to the suggestion thrown out, and the report finally adopted.

THE APPOINTMENT OF A CLERK.

The PRESIDENT said that the next business was the appointment of a clerk, for which he had received 34 applications. The following gentlemen were the candidates:—Messrs. Dover, J. Stoner, Woolrich, Cheshire, Browne, Abraham, G. H. Buckton, Coode, Curling, Burton, Cooke, Church, Smith, Gibbons, Lawford, Ferrier, Isaacson, Greene, Power, Manning, Pattison, Thompson, J. Butt, Chubb, Bust, Burt, Hore, Bailey, Johnson, Freeth, Munday, Wallington, and J. Wilkinson.

Mr. HOWS: I wish to be informed of the terms on which intimation of the office of clerk was given to the public.

The PRESIDENT: We have not a copy of the advertisement here; perhaps the resolution of the board may be sufficient.

The resolution was then read, and, according to its terms, the clerk was required to be a barrister; but the advertisement did not restrict the office to gentlemen of legal attainments.

Mr. SAVAGE: Allow me to ask if Mr. Wilkinson has resigned, or if there is any necessity for him to do so previous to his being a candidate?

The PRESIDENT: If any member of the board is elected, he must resign; otherwise I believe there is no restriction.

Mr. SAVAGE observed that he had received a circular from Mr. Wilkinson, stating that he was called on by a requisition of the board to become a candidate. Now that, he thought, was a strange proceeding, and he should like to have an explanation. It certainly placed the board in a very awkward position. If they knew how many members of the board had signed that requisition, it would save them a great deal of trouble; for, if there was a

majority, there would be then no occasion to consider any other applications.

The PRESIDENT: I can't be expected to answer that question. I have received a proper note from Mr. Wilkinson, stating that he was a candidate.

Mr. WRIGHT: I wish to know at what stage of the proceedings I shall be in order to take notice of the fact of a member of the board putting up for office. I have a resolution to move on the subject, and I wish to know when will be the proper time for me to do so.

The PRESIDENT: I think the proper time to do so would have been when the advertisement for candidates was under consideration. I understood then that there was no restriction—that all persons might apply. Any candidate whose application was not received in time is excluded. Any objection to a candidate may be stated when his name is brought forward.

Mr. WRIGHT: Allow me, then, to give notice that, when Mr. Wilkinson's name is proposed, I shall move——

The PRESIDENT: It would be most inconvenient proceeding to move now any resolution that would have the effect of excluding A or B. When we have the names of the candidates before us, we can deal with them according to their merits.

Mr. BOYSON promised to make some observations, when the proper time arrived, on the impropriety of a member of the board being a candidate for the office of clerk.

Mr. SAVAGE observed that the matter should be considered at once; for, as Mr. Wilkinson's name was last on the list, they would have to deal with every candidate before this important subject of a member being a candidate could be considered. There was nothing improper in selecting a chairman from among the members of the board, but it was very undignified to appoint members of the board to superior offices. (Hear, hear.)

The PRESIDENT: I don't want to offend Mr. Savage, but I think it would be more convenient to decide first the mode of dealing with those applications: thus we may proceed.

Mr. NICHOLAY: Then, Mr. President, in order that we may proceed at once, I now move, "That the applications and testimonials be read at once." (Oh, oh!) It is all very well to cry "Oh;" but I think we have carved out too much work to be done to-day. You have, by an advertisement, invited gentlemen to send in their applications, and I think the least you can do, as an act of justice to those men, is to have their applications and testimonials read. (Oh, oh!) By a resolution of the board, the gentleman to be elected as clerk is to have legal attainments; but that not having been stated in the advertisement, many gentlemen unconnected with the legal profession were induced to apply. I now move, "That the applications be considered; and that, as an act of courtesy and justice to those gentlemen, their testimonials be read; and that the candidates, if they think proper, be afforded an opportunity of addressing the board." (Oh, oh!) Well, that is my opinion. You have induced those gentlemen to apply for the situation, and you ought to treat them with courtesy. It is impossible, owing to the number of candidates, to complete the election to-day; but I think something might be done to narrow the list of candidates, and then you might adjourn to a convenient day.

Mr. CRELLIN: I understand there are 34 applicants; and I should like to know who they are, and on what grounds they apply.

Mr. COLLINSON: I move, "That all the applications be read, and that the testimonials only of those who are proposed and seconded be read to the board."

Major LYON proposed, "That the board should adopt the same plan of procedure with respect to the election of clerk which was pursued in the election of chairman."

Mr. TURNER suggested that all the testimonials should be referred to a moderately-sized committee. (Oh!)

Mr. OFFOR moved, "That the names of the candidates be printed and circulated among the members of the board; and that their testimonials be left at the offices in Greek Street for inspection by the members; and that the election be adjourned for a week." That, he thought, would be the most prudent course.

Mr. DOULTON moved, as an amendment, "That the applications for the office of clerk be now read and considered; and that the whole of the names be reduced to two, as in the case of the election of chairman."

Mr. D'IFFANGER seconded the amendment.

The amendment having been put to the meeting as against Mr. Offer's motion, was carried, on being put as a substantive motion.

Mr. SAVAGE then moved, "That no member of the board be allowed to be a candidate until he ceases to be a member of the board."

The PRESIDENT said the act of Parliament allowed it.

Mr. WRIGHT: I think it would be well that this resolution should be put as an amendment upon the motion before the board; and, as I wish to draw their attention specially to this subject, perhaps Mr. Savage will allow me to put it in that form.

The PRESIDENT: I have no amendment at present.

Mr. WRIGHT: I beg to propose, as an amendment, "That no member of this board be allowed to be a candidate for any office in the gift of the board while he retains his seat."

The PRESIDENT: Well, that is a something.

Mr. WRIGHT: I conceive this to be a matter of great importance, and deserving of the attentive consideration of the board; Whether we should allow a gentleman sitting as our equal to hold out his hand for an appointment which will make him our servant? The candidature for the office of chairman was perfectly unobjectionable on the part of members, for the chairman is not the servant of the board, and it would be a disgrace to the board if they could not find a chairman among themselves. I believe that, even if we were unable to find a chairman so distinguished as the gentleman whom we have chosen, we should not look beyond the board for one. But the case is widely different as respects the secretary; for, although he will be an important officer, he will still be the servant of the board. I do not mean these observations to apply specially to one gentleman of the board who is a candidate; he is a man of gentlemanly character and great attainments. I believe he would make a most excellent secretary; but I do not think it right that any of our own colleagues should become the servants of the board: I object to such a course upon principle. I think the election of one of our board to that office would place us in a false position with the public. Now, immediately after the secretary is appointed, we must proceed to the election of an engineer. I can point to a civil engineer (Mr. Carpmael), within two chairs of me, of whom I have so high an opinion that I would entrust him with the most important engineering undertakings. I see opposite to me a very distinguished architect, a member of the board (Mr. Hunt)—and such an officer will be wanting—but I object altogether to the appointment of members of this board filling such situations. I hope no gentleman will think I am personal in these remarks. I want to vindicate the integrity of the board. Indeed, with respect to the situations, if you proceed upon the principle of giving places to the members of the board, you may descend in this way till we shall have some gentlemen putting up for the office of sluicekeeper. It is most important that this board should proceed in a straightforward and independent manner. Hitherto our proceedings have been liable to no objection; even the *Times* newspaper has been compelled to admit that the conduct of the board has been unimpeachable. The press of England has given us high credit for the integrity of our motives, and for the talented manner in which we have conducted our proceedings. Let us not, therefore, descend into the jobbing arena; let us not imitate those practices which have hitherto disgraced municipal bodies. (Hear, hear.) Is it fair that I should be placed in the position of opposing a colleague? Should he be successful, he will not be able to forget that I took part against him. Suppose he is elected to any office, and afterwards discharged for incompetency, is it not probable that he will go back to his constituents and say, "Gentlemen, re-elect me, and I will go back to the board and blow them up for treating me so badly." You have now 34 candidates before you for the office of clerk; but, if it goes forth to the public that all offices are to be filled up by members of the board, what chance have we that the public will supply on a future occasion so large a list of candidates? If you fill up this situation from one of your own body, the public will say hereafter, when an office is to be filled, "There is no use in our applying; the board will select from their own body." I hope I have expressed my opinions with courtesy to the board. (Hear, hear.) I feel very strongly on this subject; I think it of the utmost importance that we should pursue a bold and honest course on this occasion. I have taken no precaution to secure a seconder for my motion, but I think the feeling of the board is favourable to it. (Cheers.) I find that a gentleman who is really a candidate and a member of this board, says that he is not a candidate, but that a requisition having been presented to him, he consented to stand for this important office. Now this very circumstance gave him a very great advantage, and an unfair one, over other candidates; indeed, such a course was calculated to deter the public from applying, and diminish the range of choice which the board would otherwise possess. (Cheers.)

Mr. SAVAGE had great pleasure in seconding the proposition of Mr. Wright. He (Mr. Savage) cordially concurred in the principle laid down that, it would be undignified in the members of the board becoming candidates for offices. With regard to Mr. Wilkinson, he could speak of him in the highest terms of commendation. Mr. Wilkinson was well known and respected in the neighbourhood from whence he came. There could be no question as to his honour, integrity, and qualification for office. His conduct was highly approved of by all those who were acquainted with him. But it was unfair to other candidates to place a member of the board in competition with him; besides they had not, as Mr. Wilkinson had, the opportunity of showing their talents for office. He (Mr. Savage) understood, on the first day of meeting, that Mr. Wilkinson would not take any office, and it was on this ground he was chosen honorary secretary. He thought, as long as he was a member of the board, he should not become a candidate for office. He could not but express his deep regret that members of the board had presented Mr. Wilkinson with a requisition, which was setting a dangerous precedent. As Mr. Wright had observed, it would not be difficult to find gentlemen on that board whose services as engineers, architects, and accountants, would be of a first-rate character, if the principle of electing from their own body were not highly objectionable. Hitherto the board stood well with their constituents and the public, and he hoped they would do nothing now which the public could stigmatise with an ugly little word of three letters, which it would be unpolite to mention. The board would esteem Mr. Wilkinson much more if he withdrew from the candidature. He (Mr. Savage) thought the board would be but consulting their own dignity by discountenancing all application for office on the part of members of their own body. (Cheers.)

Mr. BRISTOW referred to the 54th clause of the act of Parliament under which the board was constituted, to show that any member of the board; that should accept or hold any office under the board, ceased to be a member of the board. According to that clause, members of the board were eligible, and it would stultify the act to pass the resolution. If the majority of the board thought proper to elect one of their own body, they ought to have the power of doing so; but, according to the act, any member by accepting office ceased to belong to the board.

Mr. HALL: I move "That it be a bye-law, or standing order, that no member of the board be eligible for any place under the board." A similar bye-law existed in the Corporation of London for the last forty years.

Mr. TURNER agreed in the principle brought upon the board by Mr. Wright; but if, as it was objected, that by the act they had no power to pass such a resolution, he wished to observe that the resolution would not contravene the act. The act gave them liberty to elect a member of their own body; they had power to restrict that liberty by a bye-law. They did not want to extend the power of the act, but to restrict it. They had power, for example, to elect any member of their own body for clerk, but they restricted themselves by saying that he should be a member of the legal profession.

Mr. BOYSON supported the bye-laws. He did not think any member of the board should be a candidate for office.

Mr. CARPMAEL said that, if he had known on Saturday that Mr. Wilkinson would be a candidate for office, he would have sought him out, and have endeavoured to persuade him to withdraw.

Mr. Wright's amendment was then put, and carried by a majority of 20 to 15.

Mr. L. TAYLOR moved, "That the number of candidates be first reduced to six, that the testimonials of those gentlemen be read, and that the candidates be afterwards reduced to two by the same process as adopted in the election of chairman."

Mr. BIDGOOD said they had tied their hands by limiting the candidates to members of the legal profession. He thought they ought now to undo an act which might have been done without due consideration.

The PRESIDENT assured the honourable member, who had taken his chair for the first time that day, that every consideration was given to that question, and the board arrived at the conclusion that the clerk must be a member of the legal profession.

Mr. BIDGOOD: Am I to understand that?

The PRESIDENT: Yes.

Mr. BIDGOOD: Then you have lost the services of the very best man in England—the clerk of the old board.

Major LYON: You have now bound yourself by a resolution not to elect a

member of the board as clerk. I therefore think that in fairness you ought to allow Mr. Wilkinson to resign his seat at the board.

The PRESIDENT having read the resolution,

Major LYON moved "That the court do now adjourn."

After some conversation, this motion was withdrawn, and a member proposed, "That the resolution disqualifying members as candidates be conveyed to Mr. Wilkinson."

Mr. WRIGHT moved the adjournment of the election till next Friday, to enable Mr. Wilkinson to learn the decision of the board, and that that decision be conveyed to him.

Mr. COLLINSON objected to the motion. He did not think the public time should be thus frittered away. Mr. Wilkinson, as he was a candidate, ought to have been there. He did not think that the board would be justified in adjourning to suit the convenience of any individual.

Mr. BURSLEM hoped they were not going to exclude Mr. Wilkinson by an *expost-facto* law from being a candidate; it would be a gross act of injustice to that honourable and talented man. He hoped, therefore, for honesty sake, they would pass this resolution.

Mr. HOWS said they were certainly met to transact public business, but they should act fairly to all parties. The resolution which they had agreed to without his knowledge would exclude him from the candidature. It was only justice to communicate to him, before the election, the terms of that resolution.

Mr. DOULTON expressed a similar opinion.

After some conversation it was agreed, by a majority of 24 to 16, that the terms of the resolution be communicated to Mr. Wilkinson.

It was also agreed that the names and addresses of the candidates be printed and circulated among the members of the board.

The PRESIDENT wished to announce that a large number of applications had been made to him under the board; and he was desirous of informing all candidates for places that they would gain nothing by having their applications filtered through his hands. Merit alone would be the test. He had made that statement because a great deal of his time had been unnecessarily occupied in acknowledging applications of that character. All applications should be made to the board, at their offices in Greek Street. He wished the press would make this known, as it would save trouble to all parties.

Mr. Deputy HARRISON then moved, "That the election of engineer and accountant should take place on Monday next."

This having been seconded,

Mr. D'IFFANGER moved, "That the election take place on Friday week."

The amendment was carried, and it was resolved that the advertisement be inserted in the daily papers.

PLACE OF MEETING.

The PRESIDENT announced that an application had been made to the Corporation of London for their council chamber, until the board could provide a permanent place of meeting. In consequence of the corporation not meeting till the 17th, they had received no answer, but they would about the 18th or 19th; and if the answer was unfavourable, then the board, he thought, ought to allow him to provide some place of meeting for them henceforward. The question was to come before the board for the appointment of committees. That was an important matter, and required grave consideration. A report had been prepared, setting out the duties of the several committees under the act of Parliament; and he was desirous that that report should be in the hands of the members, so that they might have an opportunity of making suggestions and improvements, so as to promote the working of these committees. Another question worthy of their consideration, "Whether the duties of the appeal committee might not be performed by rota." This was a committee whose duties would involve one hard day's work in each week, in adition to the ordinary business of the board; and it was most important that some arrangement should be made by means of which the labour might be fairly distributed. He hoped they would be kind enough to resume their report on the duties of members, in order that it should be printed and circulated among the members. He did not ask them to receive their report as a complete thing, but as one that would assist; and he hoped they would improve by their suggestions.

The report was then received.

At the recommendation of the PRESIDENT, Mr. Hawke's motion, about obtaining a permanent place of meeting, was postponed until an answer to their application was received from the Corporation of London.

Major LYON, in consequence of the lateness of the hour, postponed his motion respecting the width of streets and alleys.

The board then adjourned to Friday, the 18th.

FRIDAY, JAN. 18.

The board met this day at Burlington House, at twelve o'clock at noon.

Mr. THWAITES presided.

The minutes of the previous meeting having been read and confirmed,

Mr. L. TAYLOR announced that the Common Council of the City of London had, on the previous day, by an unanimous vote, placed the council-chamber at the disposal of the board. (Cheers.)

The PRESIDENT said he was quite sure the act would be appreciated by them, and tend to unite rather than divide the governing bodies of the metropolis. The board would remember that, at a previous meeting, he had stated that he had felt it necessary to retain the services of the sluice and flap keepers connected with the late Commission of Sewers. They were about thirty in number, and their engagement will terminate about the 15th of January. He felt it necessary, however, lest damage should be done to the public service, to authorise them to continue their services until the board would be prepared to make permanent arrangements. He hoped the board would indemnify the act.

ELECTION OF CLERK.

A letter was read from Mr. Wilkinson, tendering his resignation as member of the board.

The PRESIDENT said, they were aware that the act of Parliament only required that a member should send his resignation to the president. He had received a letter from Mr. G. F. Cook, the vestry clerk of St. Pancras, who requested official information as to whether Mr. Wilkinson had formally resigned, that he (Mr. Cook) might be enabled to communicate their reply to his board. He (the president) did not think it respectful to the Board of Works to communicate to any one the resignation of a member before he had made themselves acquainted with it. He had in this case followed the course pursued with respect to the resignation of Sir John Shelley.

Mr. TURNER thought a different course would have been more proper. The moment the president read the resignation, the act of resignation was complete, and no inconvenience could have arisen from his communicating that circumstance to the vestry. Although the board should feel obliged to the president for his courtesy to themselves, yet the earliest opportunity should have been given to the vestry to elect a gentleman in the place of Mr. Wilkinson.

Mr. L. TAYLOR considered the course taken by the president was right, and trusted in future he would adopt another course.

The PRESIDENT said, he had followed the course pursued at the time of Sir John Shelley's resignation. He thought it would be inconvenient, and disrespectful to the board, if the first announcement of the resignation of a member was made in some other place. If, however, the board thought it right to resolve that, immediately on the resignation of a member, he (the president) should communicate with the vestry clerk, he should do so.

Mr. HOWS said, it would be invidious to pass a resolution of that kind, and recommended that the matter should be dealt with in a bye-law.

Mr. TURNER said, it was unjust towards the vestry not to give them the earliest opportunity of electing a gentleman in the place of the gentleman who had resigned. Without intending anything disrespectful to the president, whose courtesy he acknowledged, he would move, "That the president be requested, on the receipt of the resignation of any member, to send a notice of the resignation to the proper officer."

The motion having been seconded,

Mr. HUNT moved "The previous question."

Mr. Turner's motion was then put to the meeting and lost.

The PRESIDENT said that he had carefully gone through the applications for the office of clerk, and found that, out of the 31 candidates, seven of them—Messrs. Stoner, Tabraham, Buckton, Ball, Burt, and Freeth—were not of the legal profession, and that Mr. Wallington had withdrawn his name. As the board had decided that the clerk should be of the legal profession, he had removed their names from the list.

A resolution was proposed, "That the election should be proceeded with by putting the names of the candidates to the board *seriatim*, reducing the number to two." An amendment was proposed, "That the number should be reduced to six." On a division, the amendment was carried by a majority of 33 to 6.

A show of hands was then taken for the remaining 23 candidates, all of whom belong to the legal profession, with the following result:—

Mr. Curling	29	Mr. Gibbons	0
Mr. Woolrych	26	Mr. Lowford	0
Mr. Cook	26	Mr. Ferrier	0
Mr. Wilkinson	26	Mr. N. W. Greene	0
Mr. Isaacson	20	Mr. Power	0
Mr. Coode	15	Mr. Manning	0
Mr. Brown	11	Mr. Thompson	0
Mr. Mundell	6	Mr. Clubb	0
Mr. Simon	4	Mr. Best	0
Mr. Bayley	2	Mr. Hare	0
Mr. Pattison	1	Mr. Johnson	0
Mr. Church	0		

The list was then reduced to the following gentlemen:—Messrs. Curling, Woolrych, Cook, Wilkinson, Isaacson, and Coode.

A discussion took place whether the candidates should address the board, or their written applications and testimonials be read, in the course of which some strong remarks were expressed, on printed slips having been forwarded to the members containing extracts from "Hansard" of speeches delivered in the House of Commons reflecting on the conduct of one of the candidates.

Mr. L. TAYLOR said, they had now six candidates before them, and, instead of reading their testimonials, he would move, "That the applications be read, and that each candidate be called upon to address the board;" and he thought that the ability and discretion of the candidates would be best shown by their condensing their observations as much as possible.

Mr. Deputy HARRISON seconded the motion, which, after some discussion, was adopted.

Mr. CURLING, having the largest show of hands, was first called on. He said he had framed the Bermondsey Improvement Acts, and other acts of Parliament, being upon the questions the board would have to determine. If elected, they might rely on his discharge of the duties with zeal, honesty, and faithfulness to the public service.

Mr. WOOLRYCH next addressed the board. He had been 6½ years secretary to the Metropolitan Sewers Commission. He was aware that charges had been made against him—some anonymous—and attributing to him partisanship in his office in the late board, which he denied. A charge which had been made against him by a right honourable baronet, now holding high position in her Majesty's councils, he felt bound to reply to. He admitted the truth of the statements of Sir B. Hall as to there being minutes on loose sheets of paper in his office, and that he came there one day and could not find a particular document, and that his clerks were in some confusion; but the fact was that the arrear of records occurred at a time when he (Mr. Woolrych) was so pressed with labour on account of having to attend to the proceedings of a Chancery suit which had been instituted against the board, and which compelled him to work not only night and day, but even on Sundays. He wished to remark that, although the general minutes of the board were not entered, the [minutes of the general committees were all entered, and those of the general board were a mere echo of them. After referring to the laborious duties he had performed, Mr. Woolrych hoped that board would not form their opinion of him from a circumstance which was five years old, but look at the state of his office, and the books and documents therein, at its close, when all its affairs would be found entered up to the last minute.

In answer to questions from Major Lyon, Mr. WOOLRYCH admitted that, although he was so overworked at the time in question, he did not apply to the Board of Commissioners for extra assistance.

In answer to Mr. Offor, he said he had entered 100 volumes of minutes since he had been in office, and 99 of the books were a foot wide.

Mr. OFFOR could corroborate this, and said, so far from irregularity, whenever he required an old report, which he often did, he had it instantly, and found everything in the greatest order. (Hear. hear.)

Mr. E. R. COOK said he took high mathematical honours at Cambridge, was a member of the bar, and had been engaged for St. Pancras, and in drawing the Whitechapel Improvements Act—subsequently the Metropolis Burials Act and Buildings Act—and he was well acquainted with, having written an analysis of, the Metropolis Local Management Act. Although he had not the advantage either of having served the old commissionf, or of having been a member of that board, he felt he had some claims as a candidate. (Hear, hear.)

Mr. JOSIAH WILKINSON said the observations of the gentleman would have had force had he, as a member of the board, used his position to canvass; but his colleagues were aware he had not done so. In order, however, that he should not be considered as using any further influence, he would, with these remarks, leave the matter, so far as he was concerned, in the hands of the board.

Mr. ISAACSON also offered a few observations to the board, but Mr Coode was not present. His letter of application was, however, read.

The show of hands was then taken, with the understanding that the candidate standing lowest on each show be struck out. The result was as follows:—

	1st. Show	2nd.	3rd.	4th.	5th.	6th.
Woolrych	22	20	21	22	23	34
Wilkinson	21	22	22	21	19	
Curling	14	16	15	12		
Cook	11	10	8			
Isaacson	8	5				
Coode	6					

The PRESIDENT put to the vote, "That Mr. Woolrych be the clerk to the board," and 34 hands were then held up, and he was declared duly elected; and having returned thanks, took his seat amidst loud applause.

The PRESIDENT remarked, in reference to an observation that had been made, that he could work with any one, as all he wanted was honest and straightforward conduct. He hoped that any little differences, now that the election was over, would be forgotten, and that they should all work together to carry out the great object for which that board had been appointed, to the satisfaction and benefit of the public. (Applause.) He would propose "That a vote of thanks be given to Mr. Drew for his efficient discharge of duties as honorary secretary."

Carried by acclamation.

Mr. DREW having briefly returned thanks,

Mr. CORRIE said he had opposed the election of Mr. Wilkinson to the office of clerk, but he thought the warmest thanks of the board were due to that gentleman for his valuable services as honorary secretary. (Hear, hear.)

Mr. L. TAYLOR, in seconding the motion, said that the services both of Mr. Drew and Mr. Wilkinson were most efficient, and thought they ought not be acknowledged by a mere dry vote of thanks. He would move "That the matter be referred to a committee to consider——" (Oh!) Well, he dared say that they would feel themselves amply remunerated by the good opinion of the board.

The motion was then agreed to.

WIDTH OF STREETS.

Major LYON, in bringing the motion of which he had given notice, "That no new streets be permitted to be constructed in the metropolis of less width than 40 feet, and no alley less than 20 feet," said he had postponed the motion in order to have an opportunity of consulting the Building Act, and deliberating with his friends as to the best mode of expressing the regulations he intended to have established. He had copied the phraseology of the act, and all builders would now have an opportunity of knowing the risk they incurred by erecting any buildings that did not comply with the terms of that act.

The motion, which was a very long one, described with great minuteness the respective widths of streets and alleys, and other sanitary regulations.

Mr. HUNT seconded the motion.

Mr. WRIGHT said, the resolution was not the one on the paper, but a long and complicated motion, of which the members had no previous notion.

The PRESIDENT said the honourable member would recollect that at the last meeting it was agreed that the notice on the paper, which was substantially the same as that now moved, would be postponed, in order that it might be expressed in the very words of the Metropolitan Building Act.

Mr. HUNT: This resolution is an exact copy of a provision of the old act of Parliament; and, unless you pass this resolution, great mischief may be done.

The motion was unanimously agreed to.

Mr. HALL moved, "That it be a bye-law, or standing order, that no member shall be eligible for any office of emolument in the gift of the board." If they wished to continue high in the confidence of the public, they must do this. He thought they ought to go further, and add, "or until he has ceased to be a member of the board twelve months." (Applause.)

Several members of the board rose to second the resolution; but, at the suggestion of the President, who said all the purposes required would be answered by referring the resolution to the bye-law committee, to be embodied in the bye-laws; that course was adopted, and the board broke up after a long sitting.

THE GAS QUESTION IN LIVERPOOL.

A Special Meeting of the Council was held in the Council Chamber, Town Hall, on the 9th inst.—the Mayor, J. C. STEWART, Esq., presiding. The following were the other members present:—Councillors Crosthwaite, Anderson, Woodruffe, Stewart, Sheil, W. Nicholson, Bradley, Holden, C. Turner, Holt, Hornby, Livingston, Banner, Fernihough, A. Shand, Wagstaff, Tobin, Fleming, Brancker, Earle, Tinne, R. Gladstone, Lloyd, Johnson, Kitchen, Aikin, Farnworth, Gregson, and Halhead; Aldermen Bennett, Preston, Parker, Robinson, Cooper, Gardner, and J. B. Moore.

It was arranged that the report of the special gas committee, and the reply of the Gas Company, be taken as read.

The resolutions of the special committee, passed after considering the reply of the directors, were then read, which included the following reports from Messrs. Clegg and Taunton:—

Putney, near London, Dec. 22, 1855.

Dear Sir,—I beg to send you the following observations upon those points of the reply of the Liverpool United Gaslight Company to the town council, which have reference to the flow of gases, and to the leakage, from street mains, &c.

I stated, both in my report and my evidence, that a lighter gas would, *cæteris paribus*, issue through an opening with greater velocity than one of greater specific gravity. This fact has for very many years been so clearly established, and so universally accepted, that I am surprised to find it contradicted.

I assume that the directors of the Gas Company had Mr. King's assistance in framing their reply, and that that gentleman was cognizant of all contained therein.

I therefore further assume that Mr. King is either ignorant of the laws which govern the motion of fluids, or that he has contradicted me for the sake of doing so.

The circumstances in which I am placed make it unavoidable that I should substantiate my statement by explaining the mechanical laws I have referred to.

Sir Isaac Newton, Drs. Hutton, Gregory, Robison, &c., in England; Dubuat, Bossut, Birnoulli, Eytelwein, and others, on the continent, have established these extremely simple principles:—

1. The velocity with which a fluid under pressure issues from an orifice, or pipe, is the same as that which a heavy body would acquire in falling through a space equal to a column of the fluid required to produce that pressure.

2. That of different fluids under the same pressure, those specifically lighter must acquire a greater velocity, and their different velocities will be to one another as the roots of the specific gravities of the fluids.

The height of a column of the fluid which would produce a pressure p is $= \frac{p}{s}$.

The theoretic velocity, v, acquired by a body falling through any space, h, is expressed by $v = \sqrt{2\,g\,h}$, g being the force of gravity, viz., 32·19, we have $v = 8{\cdot}02\sqrt{\frac{p}{s}}$ or $p = \frac{s}{2\,g}\,v^2$.

Friction, however, is an element that must be taken into account in obtaining practical results; and first, it is proportional to the extent of the rubbing surface of the pipe through which the fluid passes, or to the length multiplied by the circumference ($l\,c$). 2. It varies with the velocity to some extent. 3. It is proportional to the specific gravity of the fluid.

If F represents the force required to overcome friction, $F = l\,c\,S\,v^2$.

It is necessary to ascertain by experiment a certain constant quantity, M, the "co-efficient of friction," and $F = M\,l\,c\,S\,v^2$.

The additional force required to produce motion may be expressed by $p'\,a$; p' being this additional pressure, and a the area of the pipe; $p'\,a$ is equal to F.

$$\therefore a\,p' = M\,l\,c\,S\,v^2; \text{ or}$$

$$p' = M\,l\,\frac{c}{a}\,v^2;$$

and get, by taking gravity again, into the equation, $p \times p' = \frac{s}{2\,g}\,v^2 \times M\,l\,\frac{c}{a}\,S\,v^2$, which is the general equation for the motion of a fluid in a pipe.

The value of the "co-efficient of friction," M, has been thoroughly established by experiments on a *working* scale, both in Paris and London; and the formula for calculating the actual passage of fluids through pipes has been diligently investigated by Mr. Hawksley, Mr. Wm. Pole, M. Girrard, and my son.

I make my calculations in accordance with the foregoing principles, and give the following examples, taking the cases of pure hydrogen gas and atmospheric air.

Required the quantity of atmospheric air that would be discharged by a pipe one inch diameter, and 100 yards long, with a pressure of half-an-inch head of water. $S = 1{\cdot}000$. The formula is:—

$$Q = 1350\,d^2\,V\frac{h\,d}{s\,e};$$

and I give the computation:—

$$1 \times 1350 = 1350\,V\frac{5 \times 1}{1 \times 100} = V\frac{5}{100} = 707$$

$$1350 \times 707 = 954{\cdot}45 \text{ cub. ft. per hour} = Q.$$

Required the quantity of pure hydrogen gas that would be discharged, under the same circumstances as the last:—

$$S = 0691$$

$$1 \times 1350 = 1350\,V\frac{5 \times 1}{0691 \times 100} = V\frac{5}{06{\cdot}91} = 848$$

$$1350 \times 848 = 1141{\cdot}80 \text{ cub. ft. per hour} = Q.$$

So that the lighter fluid acquires a greater velocity than the heavier one, urged through the same pipe, with the same pressure; the increase of velocity giving an increased discharge of 190·35 cubic feet per hour.

I therefore repeat, that a lighter gas passing through the same meter, and through the same burners, urged forward by the same pressure, will travel with greater velocity, and cause the meter to revolve more quickly, than a heavier gas. Another part of the same question: Consumers, having been accustomed to the light given by a heavier gas, would naturally turn on their taps so as to get the same quantity of light from the lighter gas. This would increase the openings through which the lighter gas would flow, and be an additional cause for the meter to revolve with greater rapidity, which the Gas Company say "is so evident, that it hardly required to be confirmed by my testimony." I say that the burners are turned higher to get the same quantity of light from the lighter as from the heavier gas, which is a natural thing for a consumer to do; and I do not admit what the Gas Company say, that "a diminution in price *always* produces a less careful use of the article." It may in some cases, but it is the exception, not the rule; and I adhere to my opinion, that the two circumstances combined will account for the gas bills of the consumers being larger with cheaper than with dearer gas, their burners being the same in number and size.

With regard to the loss by leakage from the Gas Company's mains—

The Gas Company say, in their reply, that "no evidence was given to me, as a Commissioner of Woods and Forests, in the Liverpool Gas Inquiry in 1847, which can justify my assertion, that the loss of gas, through leakage and otherwise, is at least 20 per cent."

The following is part of Mr. King's evidence, given before me:—"The total quantity supplied by the Gaslight Company to private consumers by meter is 171,203,000 net; the quantity made was 245,000,000; the quantity lost was 31,000,000." And I may conceive that the inaccuracies of the meters are not taken into account.

Mr. King, in his evidence before Mr. Lowe, on Feb. 8, 1847, says, the leakage is rather better than 11 per cent.

Therefore, it is quite true that the evidence of Mr. King went to show that the leakage was *not* 20 per cent., as I state it to be. During my experience of fifty years (which, I think, will be admitted even by Mr. King, has not been without good fruits), I have never met with any town whose street mains showed less than 20 per cent. loss. And the following extract from the report of Messrs. Ellison and Lowe on the Liverpool Gas Inquiry will show that Mr. Low is of the same opinion with myself concerning leakage:—"With regard to the leakage, we have no hesitation in reporting that Mr. Cox's estimate is lower than what the practical experience of the best-conducted works shows to be the actual loss from that cause; and we would dwell the more upon this point, because, whilst the leakage is only estimated at 10 per cent. by Mr. Cox, we are perfectly well satisfied that 20 per cent. would be nearer the mark; which allegation we are justified in making, the more particularly from all the evidence upon the subject given to us throughout the whole of the investigations we have conducted in the course of these inquiries."

I must apologise for not sending this reply earlier, but indisposition has prevented me from giving the matter attention before.

I remain, dear sir, yours, very truly, SAMUEL CLEGG.

REPORT BY MR. TAUNTON TO CHAIRMAN OF SPECIAL COMMITTEE.

Sir,—Having carefully perused your report, together with the reply of the Liverpool United Gas Company, I feel it imperative on me to make some observations thereon; but, before doing so, I cannot but express my surprise at the way in which I am attacked by the Gas Company in their reply to your committee (if reply it may be called).

Now, in order that I may be clear and understood, I must be allowed to go to some extent into detail; and I would first observe, that on my arrival in Liverpool I was introduced to Mr. King, the engineer of the company, by yourself; and after some conversation, having reference to my appointment by the corporation of London, the matter was fully discussed and settled as to the mode I was about to adopt in testing the Liverpool meters; and Mr. King then most distinctly stated that he saw not the least objection to that mode, which was the using of a test-meter at the consumers'; and Mr. King at this first interview observed, that if it did not prove an accurate test it would be something new to him.

It is quite true, Mr. King throughout wished the meters to be brought to the gas-holder; but why did he wish this? Because he well knew the results could not be the same as I obtained when using my test-meter, there being so many meters out of a proper level; and I need not say disputes would have arisen as to whether I was testing them under the same circumstances as the meter was working at the consumers'; and therefore I feel sure of having adopted the only correct mode.

I stated to Mr. King that I would use a wet or water-meter for my experiments if he preferred it, but with this proviso, that he would not object to that test hereafter, as I assured him I would do my best to keep it to a perfect level; but to this proposition he would make no promise.

I stated in my report, that the meters I brought from London were put to a most severe testing in the presence of Mr. King and Mr. Edwards, Mr. King's deputy. There is no denial of this in the company's reply.

From page 10 of the company's reply, I quote the following:—"Mr. Taunton, no doubt, succeeded in impressing the committee with the belief that the officers of the company had approved of this mode of testing; but nothing could be further from the fact."

Now, sir, as you, the chairman of this committee, were present when Mr. King over and over again said he could not see the least objection to the mode of testing about to be adopted, it needs no observation of mine; but with regard to the term "sanction" the mode of testing, it is quite true, when Mr. King saw that the results were unfavourable, he then used these words—"Mind, I never sanctioned that mode of testing;" and as often as Mr. King made this observation my reply invariably was this—"But, Mr. King, you always said you saw no objection to it, which does amount to the same thing."

A little lower down on page 10 of the company's reply, it is stated that you, sir, the chairman of this committee, during Mr. Clegg's examination before the committee, addressed to him the following remark:—"Mr. King stated, instead of meters being tested as they stood, they ought to be taken off and taken to the works;" but the company have forgotten to give Mr. Clegg's reply—although short, very significant—"that Mr. King knows better than that."

It is then stated that Mr. King, at my request, granted me the assistance of two men. This I deny. Mr. King said from the first that any assistance I wanted I should have, which favour I over and over again acknowledged. But I would here have it distinctly understood that the company's officers were not wholly engaged by me, for they had instructions to record everything that took place, which I shall take to be one very clear proof that the mode of testing was recognised by the company. On page 11 it is stated that, during the first trials, Mr. Edwards, principal foreman of the company, also attended to observe and report on my proceedings, but was forbidden to sanction or oppose anything I did.

But I do feel under some obligations to that gentleman for having suggested many cross-tests, in order to make sure; which cross-tests were made at Compton House, Church Street, Bathgate; and Wilson's, Cumming Place; the Liverpool Workhouse, Brownlow Hill; and other places. But I must here, sir, request your particular attention to the following significant quotation from the company's reply, on page 11:—"But what the result would have been had they been tested in the mode universally adopted, it is impossible to say." Here is an alarming admission made by the company, who are meter manufacturers, that, were the meters tested in the manner suggested by the company's engineer, it is impossible to say how they would be found. What a frightful state of things! I conclude this admission is founded upon the recent discoveries made.

On page 9 of the company's reply, the directors say, they cannot admit the correctness of the charge, that the examination of the meters had been neglected, as they employ persons for this special duty; and, in order that they may be perfectly competent, they are carefully instructed at the works of the company, and not allowed to undertake the examination of meters until they have been reported to the engineer as fully qualified. Now, in order to prove whether this is a correct statement of the Gas Company, I shall first refer to Mr. King's own statement, made at Compton House, in the presence of Mr. Smith, a gentleman connected with that establishment, and Mr. Edwards, Mr. King's deputy. Mr. King stated most distinctly, that the men the company sent to examine meters did not in any way understand what effect the water would have upon them. This statement was made in consequence of a large overcharge of water being discovered in the meters of that establishment; and it will, no doubt, be in the recollection of Mr. Smith, that Mr. King sent for and questioned the inspector of the district upon that point; and Mr. King, moreover, stated that he did not wish them to know anything about it; and if they did, it was only having by chance got the information from the shop. This statement was made to convey the idea that the inspectors could not have done what was discovered with any improper motive.

But, if we could admit that the men so employed did understand the meters so as to properly charge them, are you, sir, and your committee, to be told that the examination had not been neglected, in the face of the report which I had the honour to lay before your committee? Indeed, that report proves that nearly every meter was attended to by the consumer, and that in consequence of the inattention of the company's inspectors. But it may be proper here to refer to a few cases, in order to prove this statement; and I would observe, that in the early part of my examination I was accompanied by Mr. Edwards (Mr. King's deputy); and, having made several testings at the consumers' with the test-meter, it was suggested by Mr. King that we should make a call at a number of consumers, taking them indiscriminately, to ascertain, by opening the plugs of the meter, if there was an overcharge of water. This I most readily assented to, and I left it entirely to Mr. Edwards to name the houses we should visit, all of which we found incorrect. I need only refer to Messrs. Barton and Woodhead, grocers, Church Street, where we found the meter greatly overcharged; and when we inquired who had put the water in the meter, we were informed by one of the firm that the inspector had told them to keep the meter well filled up, and that they would be sure and get plenty of light. But I would also refer to the Corporation Museum, where we found a 45-light meter allowing all the gas to pass through unregistered, being without water. I would again call your attention to the tobacconist's, Dale Street, where we found the service-pipe brought up against the side plug of the meter, that it was impossible for me or the inspector to ascertain if it had the proper quantity of water or not; but the consumer knew when it required water by the lights going out. I need not multiply cases, and will only refer to Mr. Morrish's dining-rooms. I stated in my report that I had made an appointment to test that gentleman's meters, the hour fixed upon being seven in the morning; but the company, having got this information, sent men at six. Now, I should suppose that the men selected were considered duly qualified; but what was the result of a re-examination?—that not one of the three meters was found correct, being overcharged and out of level; and this only one hour after the visit of the company's men. But, although the directors of the gas company (on page 9) are indignant at the charge of neglect being brought against their inspectors, yet on page 12 of their reply it is admitted, as the following quotation will show:—

"It has been ascertained from inquiries which have been made—and indeed this clearly appears from the evidence before the committee—that in almost every case in which a meter was found to be overcharged, water had been added by the consumer himself. Mr. Taunton's report states this."

Now, this is not only a confirmation of the truth of my report, but an undeniable proof of the neglect and ignorance of the company's inspectors. Where, I ask, would be the necessity for the consumers to interfere with their meters if the inspector did his duty?

On page 18 of the company's reply, it is stated that Mr. Clegg, in his report to your committee, said that he did not think there was much the matter with the meters themselves, either as regards workmanship or materials.

Now no other reply could be expected from that gentleman, for it must be borne in mind that Mr. Clegg is the inventor of the water-meter; but it must not be lost sight of that Mr. Clegg makes no allusion to the meters registering correctly. This he could not do from the information which to my knowledge he received when in Liverpool, and therefore merely alludes to the materials and workmanship of the meters. Now, it will be at once perceived that meters may be manufactured of inferior materials and workmanship, and yet register correctly; and therefore this does not in any way show whether the meters are of imperfect construction or not, no allusion being made to it.

I feel sure that the committee must have every confidence in the result of my testings, from the fact that they have never been called in question by the Gas Company, the term sanctioned being merely used as an evasion; for Mr. King himself asserted, when testing the meters under the town-hall, that if my report was a favourable one, he should not object to the mode of testing; but if the report was against him, he should object.

You will remember, sir, requesting Mr. King to assign some reason for such an extraordinary observation, but he said he should do that at the proper time, and which I expected to find in the company's reply; but, as no allusion is made to it, it must be quite clear to you and the committee that no reason could be assigned for objecting to it.

On page 9 of the company's reply, it is denied that in the majority of cases the meters in use are of the company's manufacture; but they admit that the accuracy of the meters may be materially affected whilst undergoing repair; so that the objection to meters being constructed by the company should, if of any weight, equally apply to their repair. This I most readily admit; and the greater part of the meters having been repaired by the company (from forty to fifty per day going out, I was given to understand), they are equally responsible as if manufactured by themselves.

It is on the same page stated, that the company have never claimed the exclusive right of supplying meters; and it is the fact, that for years past a number of consumers have used their own meters. In what part of the town of Liverpool this class of consumers may reside I know not; for, out of the number I visited, I found but one that claimed the meter as his own, and that was a Mr. Kane, of Dale Street, carver and gilder; it was a ten-light meter, and was overcharged with water to the amount of 80 cubic inches. This would be, certainly, but a small per centage—1 out of 400.

I think I have said sufficient to show that the Gas Company's insinuations regarding the accuracy of my testings are without the least foundation. It may be well here to refer to the testings of the meters of St. John's Market. Now, these meters were tested entirely by a gauge gasholder which I had manufactured in London, and graduated by the City of London standard, and obtained the following results:—The first meter examined we found to be 5½ per cent. fast; and this meter, it should be observed, registered nearly all the gas consumed in the market, for the officer in charge of them informed me that he had instructions from some one belonging to the Gas Company to turn the supply from the other meter on only on Saturdays, when more was required. This meter, which was only used on the Saturdays, had the check-meter, and the result of this testing was three-quarters fast; but then it must be remembered that a large quantity of water had been drawn off by the company's men some short time previous, and this accounts for the check-meter registering so much less than the other. But the result of the testings of St. John's Market meters, with the gauge gasholder, fully established the accuracy of all former testings, as did also the cross-testings suggested by Mr. Edwards, Mr. King's deputy.

But I will give one other proof of the accuracy of my testings, and conclude. The editor of the JOURNAL OF GAS LIGHTING (a paper that has from the first espoused the cause of the Liverpool Gas Company) asked for and obtained from the meter-tester for the district south of London a table of testings from June to September 29, 1855, to be published in that paper on the 10th of December last, when the editor in question found that they fully established the accuracy of the Liverpool testings, only a garbled report appeared in that paper, but which was given entire in the *Gas and Water Times* of the 15th of that month. FREDERICK TAUNTON.

Mr. KITCHEN said, since he came into that room he had received a communication from Mr. King, and he thought it best that it should be now read.

The TOWN-CLERK then read the following letter:—

Liverpool United Gaslight Company, Newington,
Liverpool, Jan. 8, 1856.

Dear Sir,—I have been informed that Mr. Clegg, in a letter addressed to you as chairman of the Gas Inquiry Committee, has taken great pains to prove that, of two fluids having different specific gravities, that which is the lowest will flow through an aperture more rapidly than the other.

I regret that Mr. Clegg should have given himself the trouble of proving what no one ever denied, and, consequently, is not the question at issue. Mr. Clegg states in his evidence, that gas of inferior specific gravity propels the meters "faster than they should go." I assert, on the contrary, that the meters register *quantity* irrespective of quality; so that, if 20 cubic feet of gas pass through a meter, 20 feet will be registered, whether the gas is light or heavy, good or bad.

I have also to express my regret that the resolution of the directors of the Gas Company, to confine their reply as closely as possible to the subjects contained in the report, prevented the admission of any observations on Mr. Taunton's report, as I am prepared to prove that it contains many statements which are not correct.

If Mr. Clegg's letter is read at the council meeting to-morrow, I shall feel obliged by your also reading this note, as I am anxious that the council should not be misled as to what is the question in dispute.

I am, dear sir, yours truly, ALFRED KING.

Joseph Kitchen, Esq.

Mr. KITCHEN then rose to move the confirmation of the general proceedings of the gas committee; and, in doing so, he apprehended that it involved the passing of the following resolutions:—

1. That it be recommended to the council to propose to the Gas Company that the share property of the company be converted into bonds of the company, bearing a fair and equitable rate of interest; and that the undertaking be managed by a board of nine directors, three of whom shall be appointed by the council, three by the consumers of gas, and three by the bondholders.

2. That this committee be reappointed, with instructions to make the above proposal to the company, and to confer with them on the terms upon which the same shall be carried into effect, and to report thereon to the council; and with further instructions to recommend to the company—

A. That an immediate reduction be made in the price of gas.

B. That the borough engineer for the time being shall have access to all departments of the company's works, with every facility for testing the quality of the gas, and ascertaining the pressure at which it is supplied.

C. That the company consent to the appointment of officers responsible to the council to test, examine, and adjust the meters, on behalf of the consumers.

D. That the powers of the auditor be extended, so as to enable him to have access to all documents and accounts which he may think necessary; to enable him to report fully on the financial position of the company; and to ascertain that all moneys are paid out of, and carried to the credit of, the proper accounts.

In the first place (Mr. Kitchen continued), he would tender his thanks to that council for having appointed to-day for the express purpose of discussing this question. After all the pains that had been taken, he trusted that the council would treat the subject with that consideration which the importance of the subject deserved. When the report of the gas committee was first presented to that council, he stated in detail a great many points upon which the committee had arrived at a conclusion; and, as he did not propose on the present occasion to travel over the same ground, he would confine himself to observations upon the reply of the Gas Company. In the first place, he would state that a number of circulars were determined to be sent round for the purpose of eliciting the complaints of consumers. Now, in doing so, it must be recollected that the gas committee came to the determination to send about 100 circulars to each ward. Now, in the Gas Company's reply——

Mr. Alderman BENNETT: He refers to that committee; would he be kind enough to show us where the matter is he is treating of—what page is it?

Mr. KITCHEN said it was in the first page. These circulars were delivered by the police; but it was not true, as stated in the reply, that they were collected by the police. An objection was made by Major Greig, that policemen change their districts, and consequently could not know upon what persons to call. But there were other reasons why the returns were not so large as might be expected. The list was taken from the parliamentary list, and it turned out a good many were freemen, and not gas consumers at all; a great many had removed; and a number of circulars were not delivered at all up to the time specified for their return. But 298 circulars were returned. He would have to trouble this council with detail, and he hoped they would pardon him if he drew largely upon their patience, because it was necessary that all the facts should be fully brought before them. Of the 298 circulars returned, 252 were decidedly in favour of the appointment of a meter-inspector; 251 complained of the irregularities of meters; so that out of the returns, a very large majority were in favour of an independent person being placed between the Gas Company and the consumers, for the purpose of checking any irregularity. This showed the desire of the consumers to pay for what they actually received, and neither more or less. The next point was with reference to the meters. The Gas Company complained——

Mr. Alderman BENNETT: What page?

Mr. KITCHEN could not tell exactly what page; they complained that the mode of testing was not a correct one. Now, when Mr. Taunton came here, the committee wished him (Mr. Kitchen) to introduce him to Mr. King, for the purpose of considering the testing of the meters. He accordingly went with Mr. Taunton; and, after a long conversation with Mr. King, they went to test the meters. Mr. King went through several experiments, but the meters did not act correctly, owing, as he said, to their having just been painted. The following day was fixed for Mr. Taunton to take his meters, and they went through the most severe tests satisfactorily. Mr. King was anxious that they should agree as to the test before testing; but he (Mr. Kitchen) objected that they should agree upon the tests before the commencement. The first testing was at Compton House. The first meter tested there had been put down on the 26th of December, 1854; so that it had been there only six months. That meter was out of level; it was overcharged with water; and the result of the testing showed that it was 7½ fast. That meter, like the others, went through the most severe test by Mr. Edwards; and

every suggestion of Mr. King was carried out. The same course had been adopted with all the meters tested by Mr. Taunton. Every suggestion made by the officers of the company was applied, and nothing was left undone in order to secure a complete and accurate return of testing. The meters at the Town Hall were next tested; and, like the others, they were all fast. He was down to hear the result when Mr. King came. Mr. King did say, that if the meters were in his favour, he should say nothing about them; but if the meters all went against him, he should object to the mode of testing. He (Mr. Kitchen) immediately recalled Mr. King's attention to the expression he had just used, and said he should have made his objection to the mode of testing in the first instance. He answered, he would not make any suggestions, but would make the objection at the proper time. Under these circumstances, and under an assurance that the meters were correctly tested, and that no other mode could possibly be adopted to secure accurate results, he (Mr. Kitchen) immediately stated, that it seemed to him it was best to continue the same course of testing that had been before acted upon. Now, with reference to the approval of the mode of testing, he was particularly careful throughout that there should be no ground for cavilling. [Here Mr. Kitchen read an extract from the evidence of Mr. Smith, to show that Mr. King made no objection to the mode of testing the meters at Compton House.] Now, he must say, with reference to Mr. Taunton, it must be said that Mr. King repreated to him (Mr. Kitchen) over and over again, his opinion that Mr. Taunton was a perfectly honest man in all the tests, and expressed his evident satisfaction at the appointment of a man who understood his business so thoroughly. The servants of the company had evidently neglected their business. Why, out of 44 meters tested, 31 were found to he fast, more or less; 12 were found to be slow, more or less; and only one was correct out of the 44, and that was short of water. When it was filled up to the proper mark, it went 2½ per cent. fast. These were results which could not be at all denied. It required no engineering knowledge to prove these things. Even in one establishment, that of Messrs. M'Fie, the sugar-refiners, the errors were actually from 9 per cent. slow up to 10 per cent. fast. If they came to calculate, what must the errors amount to upon the whole meters of Liverpool? Mr. King, in his report, had said there were 29,800 odd meters in this town. Now, how many of these could be right, when there was only one right in 44? With regard to the overcharge and undercharge of water, 183 meters were examined. Of these, 7 were correct; and it must be borne in mind that a great many of those that were examined were out of level, or were undercharged or overcharged with water. It must also be borne in mind, that in respect to many of these meters—in Canning Street, for instance—the Gas Company's inspector had been seeing them a day or two previous to Mr. Taunton's examination. Now, if they did not register the meters, it was either from ignorance or neglect. Surely, therefore, it was reasonable that some one should be placed so as to see that these meters were tested rightly, and properly attended to. Now, there was a case in Dale Street, at the corner of Moorfields; it was a meter where the service-pipe was brought directly across the screw, so that it was impossible that it could be ascertained from the meter whether it was undercharged or overcharged. If they took all these things into consideration, they would surely think it required some person to superintend and see that all was correct. Now, with regard to the testing of the meters, he distinctly put it to Mr. Clegg, after he had heard that Mr. King was going to make an objection, whether it was a proper mode to test the meters as they stood, or whether they should be cut off and taken to the Gas Company's apparatus. Mr. Clegg distinctly stated that Mr. King knew far better than that, and that the more correct mode was to test them on the spot, and as they stood. As the consumers were charged with their gas through the meter as it stood, it was only fair that it should be tested where it stood. With regard to the question of quality, it was impossible for him to go into detail, because it was so scientific a question, that he must leave it to the engineers. It was stated in the committee's report that there were some reasons for believing that gas of an inferior quality had been supplied. They referred to the fact of the revenue being increased to such a large extent, while at the same time the cost of the manufacture had been nearly the same, as corroborative of the suspicion entertained by Mr. Clegg. Well, in their reply they give figures. What was the result of these figures? In 1849 their rental was £91,231; and in 1854 it had increased to £126,112. Now, in 1849 the number of the tenants was 23,486; and the cost of manufacture per tenant would be £1. 18s., and the rental of the tenant £3. 17s. 6d. Now, in 1854 the cost of manufacture was reduced to £1. 16s. 6d., while the rental was but £4. 7s. 6d.; so that, while the cost of preparation had been reduced, the amount the tenant paid was increased. Well, now, between the years 1848 and 1854, there was an increase of 4585 tenants, and the increase of the revenue was £3488. In 1854, these additional tenants were put at £6. 7s. each, while in 1849 they were £3. 7s. 6d. each; therefore he did think the committee had good grounds for making the calculation they did with reference to the quality of the gas. He would ask Mr. Cooper, or any of these gentlemen who were directors of the Gas Company, why they did not account for this in their reply? They should have paid particular attention to this point, and explained it to the satisfaction of this council. It was in this way only that they could account for the overcharges in the bills; they found that almost every bill had increased, notwithstanding the reduction of price. He believed, indeed, if the committee had sat till that day, they would have got a sufficient number of complaints to have occupied them. The excuse the company make with reference to the frost seemed to be entirely out of all reason. Was it possible that the frost could continue up to the 30th of June? In the early part of 1855 there was a hard frost; but the bills for the winter quarters exhibited the same results as those for the summer. The company mention another matter—that one quarter might be larger than another. The committee did not overlook that. Wherever they saw a difference in the number of days, the committee accounted for it in their calculations, and made allowance for it. They did not overlook anything of that kind; and he did not think there was any point connected with the subject that they did overlook; nor did he think that, to all the witnesses examined, Mr. King or the officers of the company could have put any questions to them that were not asked for the purpose of eliciting the truth. Now, the company in their reply stated that the reductions in the price of gas had always been made voluntarily. Let them refer to the facts. The committee said the reductions were made in consequence of a pressure from without. The company deny that, and give a list of the times the reductions took place, and the consequence. In the year 1844, the price was 10s. and 8s. 6d., according to the quantity consumed. After that it was reduced from 7s. to 6s. There were two companies; and the Clayton Square Company had previously charged 10s., and refused to reduce. The reduction alluded to was made in consequence of a deputation waiting upon the company; and one of the companies having reduced, the other company found it necessary to follow their example. In 1841, the Dale Street Company introduced a bill into Parliament. They wanted to raise additional capital, and to distrain upon tenants without the intervention of the magistrates, and also to charge the removal of the gas-pipes. The consequence was, that there was an opposition to the bill on the part of the gas consumers, and he believed Mr. Radley at that time actively opposed it. They did not get the bill, and the reduction was made from 7s. to 6s. In 1843 they again applied for a bill, but failed. In 1844 and 1845 there were two other companies in the field—the New Gas Company and the Consumers' Company. The consequence was, that in 1845 he found another reduction from 6s. to 5s., and then down to 4s. 6d. This was, no doubt, in consequence of the pressure from without. There was another Consumers' Company in the field; and, as soon as ever they found that this company was registered, down came the price of gas again. It was now reduced to 4s. within the parliamentary boundary, and to 4s. 6d. in the suburbs. They were perfectly justified, therefore, in saying that the reductions in the price of gas had been entirely in consequence of the pressure from without. Now, Mr. King stated in his evidence, which Mr. Clegg had referred to, that there were 249,000,000 feet of gas manufactured; 170,000,000 consumed by private meters, and 43,000,000 consumed by lamps, with a loss of 31,000,000. Now, it must be clear to all that a loss of 31,000,000 was something like 15 per cent. Mr. Clegg stated that this did not take into account the altered registration of the meters; and that, therefore, if the meters on on average registered something like 5 per cent., that would make up the deficiency. He should for a moment refer to the bonded debt of the company. It was perfectly clear that, if the company used their borrowing powers, it would be much more beneficial to the consumers. Why they did not do so, he could not understand. Now, he did not know that there was any particular point further that required any observations from him; but he would state, that having had occasion to address Mr. Clegg with reference to the loss by leakage, he received a reply stating, "I think the report you have submitted to the council was drawn up with much judgment and truth, and I entirely agree with the remarks made in it." Now, that report was not submitted to Mr. Clegg, nor to any other person, before coming before the council; and he felt much pleased to hear that they had stated nothing but what met the approval of such a high authority as Mr. Clegg. He concluded by moving the confirmation of the general proceedings of the special gas committee, and the resolutions they had submitted to the council.

Mr. A. C. Stewart: I beg leave to second the motion.

The Mayor would observe, that the first resolution on the paper was of great importance. Mr. Kitchen had explained the difference between the report of the gas committee and the reply of the Gas Company, but not one word had been said about the proposed total change of the constitution of the company.

Mr. Kitchen would not object to take the propositions separately.

Mr. Bennett: Then the confirmation of the proceedings would involve the adoption of the whole of the committee's recommendations.

The Mayor: Yes.

Mr. Kitchen: The recommendations did not propose that the corporation should buy the gas-works, but merely that the capital of the company should be worked on the same principle as the funds of the Dock Committee were; that interest should be paid to the holders of the bonds, and that a joint management should administer its affairs for the benefit of the public.

Mr. Fernihough presumed that the first recommendation involved the obtaining of an act of Parliament.

Mr. Kitchen: Yes. The committee did not say that they would accept such proposals as those contained in the report, but they desired to see how far their views would meet with the approval of the council. If such an arrangement could be made as would be beneficial to all parties, then an act of Parliament would be required. With regard to the resolutions of the gas committee, there was not anything at all in them, with the exception of the appointment of the gas and meter inspector, that would involve the council in any expenditure; and, with regard to that inspector, he should recommend that the council pay his salary, but that fees should be received, as was the case with respect to the inspector of weights and measures, and that those fees should pay the expense of his salary.

Alderman Cooper would ask Mr. Kitchen what was the security for this small sum? It was only a small sum—some £400,000 or £500,000. (Laughter.) Was the corporation estate considered to be the security? (Laughter.)

Mr. Kitchen thought the gas estate would be sufficient security.

Mr. Chas. Turner asked that the resolutions should be read, which was done.

Mr. Robertson would vote for some of the recommendations, but not for others. He would prefer that they should be put separately.

The Mayor: The question is, that all the resolutions be passed at once.

Mr. Kitchen would prefer that the resolutions should be passed as they stood; but he would submit to the opinion of the council, and move the first resolution, simply with a view to ascertain the opinion of the council on the subject.

Mr. Holt did not quite understand the object of the change, which he took to be the entering by the corporation into a co-partnership with the Gas Company.

The Mayor: Oh, no.

Mr. Holt: It would require an act of Parliament, or something of that nature, to effect the change. What was sought to be gained by it? Were the works to be under the management of the corporation?

The Mayor: No; but a board of directors, composed of three bondholders, three gas consumers, and three members of the corporation.

Mr. Holt: And the responsibilities to rest upon the bondholders?

Mr. Kitchen: Certainly.

Mr. A. C. Stewart thought the proposition very simple. The management of the property would be much more popular. The consumers of gas had a particular interest in the price of gas and the management of the company, because the moment that the shareholders got their dividend of 10 per cent., all the money saved would go towards a reduction of the price of the gas. The managers of the company had not so much interest in adopting the latest scientific modes of manufacturing gas, and in cutting down the expenditure, as a new and popular management would have. Another advantage to the company would be, that they would be relieved from any opposition by any new company being established, because the bondholders would have an interest in the new management, and the corporation, and the consumers too, would have an interest. By sending men from each of these bodies, they know that gas could be obtained of good quality, at a less price, and we should save the trouble of taking up the streets by a new company; and if the rate of interest stated to be paid on the bonds could not be paid with gas supplied at 3s., 3s. 6d., or 4s. per 1000 cubic feet, then the price could be raised, in order that the interest might be paid.

Mr. Charles Turner: Do you mean to guarantee the bondholders a specific rate?

Mr. A. C. Stewart: The managers of the company, if they could not pay the amount of interest to be stated, would have to raise the price of gas.

Mr. Charles Turner considered that the bondholders would be sufferers.

Mr. Sheil protested against this conversation being carried on.

Alderman Parker said, there must be a moving principle in the council,

and he supposed the resolution then under consideration would, if carried, compel them to go to Parliament for a bill. He presumed, too, that the council would have to pay for that bill. He gave the gas committee great credit for their long report, and the time bestowed upon it; but he thought the council should pause and go back to the year 1846, when the Guardian Gas Company's bill was before Parliament, that they might know how they stood on that occasion. He (Mr. P.) was a strong advocate for the Guardian Gas Company. He thought large monopolies were bad things at any time. The majority of the council, on that occasion, thought proper not to support that bill; and they not only did not support the Guardian Gas Company, but they entered into an agreement, and they were parties, he believed, to the amalgamation between the then existing companies. (No, no.) In 1856 it was only right that they should know the position in which they stood in 1846; and that, if they had already declared that the amalgamation would be a benefit to the town at large, they should be careful how they acted now. It was by the pressure brought to bear by the council that that amalgamation took place—whether for weal or for woe, they themselves had yet to decide. If they went to Parliament now, they would be asked, "Gentlemen, you are of an extraordinary disposition. In 1848 you said great things about the advantages that would accrue from the amalgamation; and now, in 1856, you say you were all wrong in 1848. What do you really mean?" (Laughter.) He really thought that on the occasion to which he had referred the corporation were quite wrong. He should like to know what charges they would have to go to for a bill for the proposed scheme. The council were to be made the moving parties to obtain the bill, and then the works were to be managed by three different classes of men. He did not think they would ever sanction a resolution of this kind. Again, giving the gas committee every credit for their arduous duties, and the chairman for his long speech, he could not, individually, support the resolution. The product of the recommendation was altogether out of order. There had been a great deal of straining, and the mountain had brought forth a mouse. The report was a feeble one, and could not be sanctioned by the council.

Mr. BRADLEY believed Mr. Parker was wrong in reference to the feeling of the council on the Guardian gas question. The council came to various resolutions, but the one ultimately passed and acted upon was, that they should not interfere, but should merely watch the bill before the committee of the House of Commons. The only interference they did make was, to introduce a clause for the protection of the gas consumers.

Alderman BENNETT thought that, if personal benefits would urge a man to consent to the passing of the resolution, he had that inducement. If cheap gas was a benefit to many, to him it was a much more considerable one, being a manufacturer of a great number of articles which cheap gas was the principal means of introducing to the public. And again, if a rival company was to be established, who would be so much benefited as the iron manufacturers of Liverpool? Upon every ground, as regarded personal feeling, he should be in favour of any scheme that would reduce the price of gas, or anything that would induce the establishment of a rival company; but he saw so many objections to the course taken by the committee, both for the one and for the other, that he could not, as an honest man, advocate either. The company was taxed all through the gas committee's report, more or less directly, with doing that which was not honest towards the public. Now, that was a very grave charge to make against a body of directors, who were the only parties supposed to be benefited by the various computations in the price of gas. The officers, the workmen of the company, would not be benefited by it; it would only be the revenue which would derive any benefit by it, and over which the directors had control. Who would suppose that Mr. H. S. Thompson would give such instructions to the workman? or Mr. D. Malcolmson, Mr. G. H. Lawrance, Mr. Hardman Earle, or Alderman Cooper, who were all directors, either?—gentlemen who were above the suspicion of doing a mean or dishonourable action. There was Mr. King, too, the respected engineer of the company; all he said was implicitly believed by his fellow-townsman. He was one of the most valuable men in the town of Liverpool—one whose reputation stood second to none—a gentleman whom to know was to respect him—and he was the last one who would seek to do anything dishonourable or dishonest on behalf of the company whom he represented. When he (Mr. Bennett) read the report, and saw Mr. King's name mentioned in it, he went to the Gas Company's offices, and desired that he might be allowed to see for himself the different methods by which the testing of meters was effected. Mr. King kindly consented, and he went through every department; and if he had had Mr. Taunton's or Mr. Clegg's feeling to detect error, he could not have gone there with a more vigilant eye to detect anything that was wrong; but, much to the credit of the company and its servants, everything he saw fully showed the extremest accuracy. The meters that Mr. Taunton said showed so much error were not *per se* defective; they were perfectly correct; they were defective only inasmuch as they had sometimes too much water put into them, and at others too little. He (Mr. Bennett) went into the testing-rooms, where there was a large number of meters placed for the purpose of being tested; upon several was a chalk mark, signifying that they were passed as correct, whilst others were marked to go back again into the workshops to be corrected. The explanations given him by Mr. King as to the meters were so full, complete, and satisfactory, that he was convinced, had the same statements been made to the gentlemen of the council, they would all have been perfectly satisfied of the honesty of intention and purpose of the Gas Company in the registration of the gas by the meters used in Liverpool. If a gentleman put too much water in his meter, it registered against him—if too little water was put in, it registered against the company. And here he would tell the council, that every error arising from wear and tear and leakage was against the manufacturer of gas. There was no error in such a case affecting the consumer disadvantageously. A great deal had been said about the flow of inferior gas through the meters. Great stress was laid on that point in Mr. Clegg's report, and the committee had also dwelt upon it; but so much was the public in the dark on the subject, that several gentlemen out of doors thought that this inferior gas ran through the meter so quickly that the meter actually registered more than they consumed. Now such a supposition was preposterous; it was absurd in the extreme. The meter only registered the quantity of gas consumed, whether the gas were bad or good. The question of quality had been referred to by Mr. King, and they found that the quality was far above anything that the company was compelled to produce; and the committee did not show the council any figures to prove that the quality was any less. There were, certainly, statements of a very vague and unmeaning character. One gentleman said that gas, before the amalgamation of the two old companies, was of 24 candles in illuminating power in the street lamps, whilst afterwards it was only 18. The only allusion in the act of Parliament to the quality of the gas was, that the street lamps should have an illuminating power of 18 candles. The committee in their report had stated that they sent out 1600 circulars. It was only on Tuesday that he had had one of them put in his hand; and if there was anything that could induce a consumer to be dissatisfied with things as they at present existed, it was the wording of the circular. The public were asked a number of questions, all of them trying to pump out defects. It was astonishing to him how the committee, as gentlemen, could send out such a memorandum to the public. It should have been put fairly, "Are you satisfied with your gas, or are you not?" But, no; the questions were all leading questions to elicit dissatisfaction. The sending back of only 298 out of 1600 of these documents was to him the best proof he ever knew of an Englishman being satisfied with the present state of things. A gentleman who had anything favourable to say of the company had no opportunity; there was no space left him to say a word in favour of the present gas supply. The committee then went on to say, that they "have directed their attention to the various points embraced by the resolution of the council *seriatim*, and now report thereon in the following order:—1st. As to the state of the gas supply in the borough of Liverpool. This branch of the inquiry includes the following matters:—The charge made for gas, the meters used by consumers, the quality of the gas, and the losses occasioned by the supply of gas to the suburban districts. 1st. With regard to the *charge* now made for gas. It appears from the evidence of above forty consumers, selected indiscriminately, that notwithstanding the reduction made in the price of gas on the 1st of January last, from 4s. 6d. to 4s. per 1000 cubic feet (rather more than 11 per cent.), the bills delivered by the Gas Company, and actually paid by those consumers, were larger in amount than the bills for the corresponding period in previous years, this increase varying from 10 to 50 per cent. upwards; and this although no additional gas had been consumed by them: that in some instances consumers had been charged for more gas than the quantity indicated by their meters, the quantity being ascertained (as stated by the bills) by 'computation' on the consumption of previous periods." Now, he could only say that there was more gas consumed, because the meters registered correctly. As to the charges for gas by computation, they were only made where the meter would not work; and it was a fair mode of ascertaining the amount that should be paid by the consumer to the manufacturer. If the committee had given the council their reasons under each head, the council would, perhaps, have ascertained how they had arrived at such a conclusion as they had done; but they did not. They then say, "that, taking into consideration the overcharges made from incorrect registration of meters, the present price of gas is far too high." Now, he thought, if the overcharges for gas were to be checked, it was a very good reason why the price should be raised, and not lowered. If the false registration had caused the company a larger rental, and if an honest registration would cause them to have less, it would be quite fair to raise the price of gas, that the shareholders might get their 10 per cent. interest. The reply made to the alleged overcharges was as complete and conclusive as anything possibly could be. Mr. Kitchen had told them that in 1849 the rental was £91,231, and that in 1854 it was £126,512; but he did not refer to any increase in the expenditure for manufacture. He would appeal to the council on that point.

Mr. KITCHEN said the cost of manufacture had scarcely increased at all, whilst the income had increased £35,000.

Mr. BENNETT: The cost of manufacture in 1854 was £59,000, whilst in 1849 it was only £49,000, showing an increase of £10,000.

Mr. KITCHEN: The directors say they attribute that increase to a rise in wages.

Mr. BENNETT then proceeded to remark upon the expenses of management. He said he had had put into his hand a return showing that the expenses of 1854 exceeded those of the previous year by £1500 in respect of rates alone. The parish had demanded of the company in one year two years' rates of £1500 each.

Mr. KITCHEN: I really must deny that.

Mr. BENNETT: There were two rates paid in 1854, whereas in the previous year there was only one rate. As to the construction of the meters, he denied that they were imperfect, and the committee had no right to say so. The gas could not be more honestly registered than it was now. As to the appointment of a meter-inspector, he could only say that the company were anxious for the appointment of such an officer. Mr. King and the directors had agreed to the appointment of an inspector eighteen months or two years ago. The conditions proposed to the company by the corporation were, that the inspector should be appointed and paid by the company, and have an office at the company's works. The company thought this unfair to the public. Had it been otherwise, the gas committee would have been the first to appeal against so unjust a method of arriving at the truth. It was not the paltry sum of £150 a year that would prevent the company making the appointment; but they thought he should be an officer unassociated with them.

The TOWN-CLERK said this was so.

Mr. BENNETT proceeded to say that that meter-inspector would do his duty between the public and the gas proprietary, and the directors would be shielded against such insinuations as the committee's report abounded in. As to the quality of the gas, one of the witnesses before the committee had said that it was most excellent—second to none in the kingdom in its purity and illuminating power. With reference to the supply to the suburban districts, the committee wished separate accounts to be kept of the expenditure of the company for the out-townships; the thing was so preposterous and absurd, that it would not work for an instant. As to the price of gas being reduced in consequence of the pressure from without, the idea was erroneous. The shareholders having obtained their 10 per cent. dividend, and the reserved fund having become filled in, the price of the gas became of necessity reduced. He thought it unfair that at the proposed board there should only be three directors of the Gas Company. Mr. Bennett then went on to say that the council must not act rashly in this matter; the propositions appeared to him most absurd. The council would make itself more or less liable; they would be the responsible parties if anything went wrong, or if gas were superseded by some new light, which was quite within the range of probability. It was a most fearful thing to contemplate, that the corporation should make itself liable for £600,000. He would counsel them to let well alone; for the deeper he went into the question, the more he found the object in view was a new company—a rival company.

Mr. KITCHEN: Who said so?

Mr. BENNETT: A rival company! He saw the statement that the existing company could supply the town for some time yet with gas. That was in favour of the company; but then came the antidote. The report of the committee said:—"Assuming the capital of the company already raised, and to be raised, to be as above stated, there can be no doubt that the company are capable of supplying the increasing demand for gas. It is stated by Mr. Clegg, as the result of a most careful and elaborate calculation, that works capable of supplying the present and future demand for gas, including mains, &c., could be constructed for £300,000, and that the outlay of this amount would enable a company to supply gas of a quality superior to that now used at 3s. 6d. per 1000 cubic feet, and pay a dividend of £10 per cent. on the outlay." He would call on Mr. Hughes to read the evidence of Mr. Clegg before the committee.

Mr. HUGHES read the evidence alluded to; but there did not appear in it the words, "and future," as given in the quotation from the report of the committee.

Mr. BENNETT: I ask why the committee have used the word "future" there?

Mr. KITCHEN: It is considered that the mains now used by the existing Gas Company cannot supply the future demand, because they are too small; whilst a new company would put down mains sufficiently large to supply the future demand.

Mr. BENNETT: I ask why the word "future" was put in that report, when Mr. Clegg did not use it? [Mr. Bennett here paused for a reply.] Mr. Kitchen does not answer the question. It is preposterous that the future demand could be provided for out of £300,000. The cat was out of the bag when the committee talked of a new company, and asked the council to support it. He never in his life heard such a proposition as that the Gas Company should only have a third of the representation at the board. It was very unlike honesty or justice, and he should oppose the resolution.

Mr. HORNBY, before the resolution was put, wished to say that, conceiving the resolution went no further than to authorise the gas committee to endeavour to make some such arrangement with the Gas Company as would be satisfactory to all parties, he should most cordially vote in favour of it; conceiving, also, that it in nowise pledged the council to any ulterior measure in the event of an engagement not being made with the Gas Company, and that the arrangement proposed was to procure for the interests of the gas consumers a representation at the board, he should vote for the resolution. It was the intention of the committee, and it is still their intention, that the interests of the consumers and bondholders should be equally represented. That was a matter of detail to which he was not pledged, but in the arrangement now proposed, that was not fairly carried out. The council were consumers of gas, and they represented the gas consumers; therefore their interests were identical with those of the consumers; and in order to make this a fair arrangement, it should give to the bondholders an equal representation at the proposed board. Considering this merely a matter of detail which might be subjected to modification in course of the communications with the gas committee, he should simply state that he would record his vote for the resolution.

Mr. SHEIL said, there was one point of the first importance, which should be constantly kept in view, and that was, the terms on which the Gas Company obtained their present bill; and, in agreeing with Mr. Bennett, so far as that the corporation consented in some manner to the bill, he thought the present body, as their successors, were bound to see its terms fully and fairly carried out. (Hear, hear.) By the terms of the bill, the public became, in fact, partners with the Gas Company in the management of the affairs; and he (Mr. Sheil) felt sure that Mr. Bennett had no partners, otherwise he would not have objected so strongly to an investigation. Now, if he were a partner with Mr. Bennett, he would think himself fully entitled to examine all the affairs of the partnership; and, notwithstanding the high eulogium passed upon the Gas Company, he still contended it was their duty to look into accounts, ascertain how the affairs were managed, and see whether through ignorance, imbecility, or any other cause, they were not deprived of a fair participation of profits. What was the position in which the town of Liverpool stood in respect of the Gas Company? As soon as the Gas Company divided 10 per cent., they had no interest in good management after; they could get no more; and therefore it became the duty of consumers to assume the interest, and see what could be done. (Hear, hear.) One part of Mr. Bennett's speech, he conceived, very fully answered the other. He passed a high eulogium on the Gas Company—repeated their names to frighten the council with the idea of an examination of their accounts—and then he came to say of the committee that their statements required to be examined. There was not a man amongst them who, knowing his business, would not examine the accounts of his best friends; and the question, he repeated, for the council to bear in mind was, that the people of Liverpool were partners in the Gas Company—that they were fully entitled to investigate the whole of their proceedings, and examine the whole of their accounts. The measure proposed was only one step—only a medium for the investigation which the committee proposed; and, if Mr. Bennett had a better proposition, the committee would be happy to agree to it.

Mr. Alderman COOPER suggested that, as Mr. Sheil claimed a partnership, he would be deprived of his vote on the question, as an interested party.

Mr. KITCHEN briefly replied: Mr. Turner, he said, had asked the question, Who was to guarantee the bondholders? He (Mr. K.) would reply by asking another question, Who guaranteed the bondholders of the Dock Estate? Why, the estate itself; and, therefore, if the proposed arrangement were carried out, the bondholders could be in no worse position than they were at present. Mr. Kitchen then proceeded to deal with the question of the difference of register in wet and dry meters, but was interrupted by

The MAYOR, who informed him that he was then entering on matter that did not properly belong to his reply.

Mr. KITCHEN, under these circumstances, declined proceeding.

A division then took place, when there appeared: For the resolution, 16; against it, 12. Four members of the council, as interested in the Gas Company, declined to vote.

On the motion of Mr. KITCHEN, seconded by Mr. BRADLEY, the second resolution, with its recommendations, was adopted.

CITY OF LONDON GAS COMPANY.

The Half-yearly General Meeting of the Proprietors was held at the Company's Works, Dorset Street, on Wednesday last, the 16th inst., ROBERT ALEXANDER GRAY, Esq., in the chair.

The SECRETARY (Mr. R. J. Millar) having read the advertisement convening the meeting, the minutes of the last half-yearly meeting were read and confirmed.

The SECRETARY then read the report of the directors, which was as follows:—

The machinery alluded to in the last half-year's report for the more extensive use of the clay retorts was completed in the autumn, and is now in full and effective operation.

Your committee have now to report, that since midsummer they have received the sum of £6350 on account of the trust fund, making, with what has been reported previously, £22,930. Your committee again request contributions towards the £7070 required to complete the £30,000 agreed to be raised by the proprietors at the special meeting, on 21st February, 1854, that they may be relieved from the necessity of having again recourse to the treasurer for advances.

Your committee report, that during the half year they have been compelled to incur several heavy items of expenditure, considerably exceeding in amount what, under ordinary circumstances, might have been anticipated. The first was occasioned by the state of one of the ranges of the retort-house, which, on being examined, was found to be in such a dilapidated condition that it could not be repaired, and had to be rebuilt, at a cost of nearly £2000. Another arose from the heavy additional expense attendant on the purifying of gas by dry lime, as compared with the mode formerly in use; and to this has to be added the outlay incurred in enlarging the company's mains in several parts of the district, to meet the increasing demand for gas, and to supply the Tower of London, now for the first time lighted with gas. This last will, however, in succeeding half years, add considerably to the revenue of the company.

The half-year's accounts, duly certified by the auditors, will now be read. The rental for the half year is £31,597. 2s. 2d., being an increase on the corresponding period of 1854 of £2234. 13s. 10d., while for the whole year the increase is £5889. 10s. 7d.

From this additional rental it would afford your committee much satisfaction to be able to announce a corresponding augmentation of profit; but, from the detail of increased and unavoidable expenditure above referred to, the proprietors will not be unprepared to hear that the net profit is considerably reduced.

The balance at your disposal is £3319. 19s. 2d., subject to income-tax; and out of this sum your committee recommend you to declare a dividend on your capital for the last half year at the rate of £2 per cent. per annum, and that the same be payable, free of income-tax, on the first Tuesday in May next, between the hours of twelve and one o'clock, and on each succeeding Friday and Tuesday between the same hours.

Referring to the 12th bye-law of the company, your committee further report that they have found it necessary, from the enlargement of the company's business, to appoint an additional collector, at a salary of £135 per annum; and they have only to add that, pursuant to the provisions of the act of Parliament, they again resign their seats.

They have, during several years, enjoyed the confidence of the proprietors, not only when the company was more prosperous, but especially in the changes through which it has recently passed; they have, therefore, much pleasure in again offering themselves for re-election.

The half-year's accounts and general balance-sheet were also read, as follows:—

STATEMENT OF PROFIT AND LOSS, FOR THE HALF YEAR ENDING CHRISTMAS, 1855.

Dr.		*Cr.*	
To cost of coals consumed, including porterage	£20,401 7 5	By rental	£31,597 2 2
Rents, rates, and taxes	1,572 9 4	Coke	8,415 11 2
Wages	7,092 10 6	Breeze	286 1 6
Committee of management and auditors	493 19 6	Liquor	395 11 6
Salaries	1,764 5 0	Tar	1,198 16 0
Tradesmen's accounts	6,956 15 4	Old materials	437 0 10
Repairs and depreciation of meters	363 3 7		
Petty cash disbursements	350 1 5		
Interest	637 15 11		
Bad debts, &c.	347 17 6		
Balance	2,320 17 8		
	£42,300 3 2		£42,300 3 2

GENERAL BALANCE-SHEET, CHRISTMAS, 1855.

Dr.			*Cr.*		
To capital		£300,000 0 0	By plant		£288,659 10 5
Amount due to trustees of loan fund		23,285 13 3	Leasehold property		5,184 0 0
Debts due to sundries		28,530 18 3	Amount due for light	£26,099 12 4	
Balance carried down		3,319 19 2	,, coke	3,213 0 0	
			,, sundries	1,102 14 5	
					30,415 6 9
			Amount of cash on hand	856 6 1	
			,, petty cash	6 9 3	
			,, City gas shares	9,876 0 0	
					10,738 15 4
			Stock on hand—coals	3,491 17 3	
			,, materials	1,855 11 9	
			,, meters	15,491 9 2	
					20,138 18 2
		£355,136 10 8			£355,136 10 8
			Balance of profit brought down		£3,319 19 2

The CHAIRMAN then rose and said:—Gentlemen, before I ask you to adopt the report, I can easily anticipate the disappointment which you all experience in the announcement made by the committee of so small a dividend on the present occasion. Had I not an opportunity of giving a satisfactory explanation of the causes which have led to the difference between this half year and the last, I should feel a degree of alarm for the prosperity of the company which I should ill attempt to conceal from you. We do, however, possess the elements of prosperity, though, unfortunately, we have to contend with a very low price for gas, which I hope will not be of long continuance; but while it is, our profits will be proportionately small. Our consumption of coal is very much on the increase, though the rental for gas for one quarter does not correspond to the quantity of coal so consumed. While I am on the subject of the increased consumption of coals, I will just refer to the previous four years. At Christmas, 1851, the quantity of coals consumed was 34,603 tons, which produced a gas rental of £54,913. In 1852, the quantity of coals was 37,220 tons, and the rental £56,395. In 1853, the quantity of coals was 39,591 tons, and the rental £60,363. In 1854, the quantity of coals was 39,984 tons, producing a rental of £60,023; and in 1855, the consumption of coals was 45,498 tons, and the rental £65,903. Comparing the rental of 1851 with the rental of 1855, you will find an increase in the consumption of coals of 11,000 tons, clearly showing that the low price of gas has tended to increase the consumption of that article. With respect to the smallness of the dividend, I will direct your attention to one of the causes given in the report just read to you, and that is the rebuilding of one of the ranges of the retort-house, which, on examination, was found to be in so defective a state that it was necessary to take it down, as it could not be repaired, and the rebuilding of which entailed an expenditure of about £2000. Had that not been the case, you would have had so much more money to divide; but we felt that it would be too hazard-

ous to attempt to keep the range in use, with the probability of its breaking down at a period, perhaps, when we should have been put to the greatest inconvenience; for that range comprised 198 rertorts, which is nearly one-fifth of our productive power. Had we gone on, and it had broken down in the winter, we should inevitably have failed to supply the quantity of gas demanded from the company. Another cause of the diminution of profits is that of the quarter between June and September not realising so much rental as it ought to have done for the quantity of coal consumed. We have found, for a long period of time, that every ton of coals realises 7500 feet of gas, which comes into the exchequer; but, from some cause not explained, in the quarter between June and September, it did not realise more than 5500 feet, making a difference of rental, arising from the deficiency in the quantity of gas obtained from the quantity of coal consumed, equal to nearly £3000. Had we not lost that sum, and had we not been compelled to rebuild the range, instead of having £2400 to divide, you would have had about £5500. But what we have done we shall probably not require to have done again for ten or fifteen years; and, though you feel the inconvenience of so large a reduction in the profits of the concern, you will have the satisfaction of knowing that you will reap the advantage of the outlay hereafter. Now, it has always appeared to me to be a wrong policy to charge in one half year those expenses which properly belong to, and might be extended over, a much longer period; but that has hitherto been the practice of the company, and, of course, we have adhered to it. In addition to what I have stated, allow me to say that the attention of your officers has been directed to the subject of the consumption of coals without any return in gas. Whether it has arisen from leaky mains or not, we cannot tell; but, as I say, our anxious attention has been, and still is, directed to the subject. The great loss of gas ceased at Michaelmas; there has been none since; and the quantity of gas manufactured now corresponds with that produced in preceding quarters. I have no doubt that the loss has partly arisen from mains being broken. For many years we had seldom required to mend our mains at all. In 1847 we had 67 leaky mains; in 1848, we had 64; in 1849 we had 65. Since the establishment of the Great Central Company the soil has been disturbed, and, no doubt, from the subsidence of the earth after it had been broken up, these leakages are the consequence. In 1850 we had 69 leaky mains; in 1852, 141; in 1853, 128; in 1854, 150; and in 1855, 236. That, no doubt, will account for a part, though only an inconsiderable part, of the loss. I have given you my reasons for thinking that our next half year will be much better than the past. I have no doubt about it myself. I am much disappointed that our labours during the last six months have not resulted in a better dividend for you; but we must not lose sight of one thing, and that is, that there are many companies not even so well circumstanced as ourselves, and which are not in a situation to give their proprietors any dividend at all. I beg to call your attention to the time when we capitalised the £50,000, making our capital £100,000; and to remind you that, for three years after that time, the dividend was 15 per cent. upon the subscribed capital. And now allow me to say, that of the bonds which we have been authorised to issue, only £23,000 have been subscribed. In proportion as you increase your works, you must have additional capital to carry them on with. Owing to our capital not being large enough, we have been obliged to apply to our treasurer, Sir Charles Price, for advances; and I think it right to say that, whenever we have made such applications, they have always been readily acceded to. But I am of opinion that a company like this, that has enjoyed such unexampled prosperity, ought not, when a little subscription is required, to experience a difficulty, but that the proprietors ought to come forward with the £7000 yet needed to work the establishment. I must say I am astonished at the apathy manifested in this matter. The proprietors must not lose sight of this one point—viz., that the prosperity of the company, and the character of the individuals connected with it, mainly depend upon the promptitude with which we meet all our engagements. I therefore sincerely trust we shall have the £7000 at once, and this will give us a floating capital which will supersede the necessity of applying to the bankers for assistance. The £23,000 already subscribed have been subscribed by gentlemen holding 640 shares. Now, the number of shares in the company is 2000; and, supposing that 400 of these are in the hands of trustees who cannot take up any portion of the bonds, there are yet 960 shares the holders of which have contributed nothing. There are persons who hold a large number of shares, but a feeling of delicacy prevents me from naming them; yet I do trust that in the end they will see it their duty to come forward and do their part, and thus place in the hands of the committee a sufficient sum for the proper working of this great concern. My honourable colleagues and myself ought not, in addition to the responsibilities which devolve upon us in the daily administration of the affairs of the company, to be called upon for money; financial matters ought not to press upon us. It is quite sufficient for us to have to attend to the manufacturing department; and I can truly say that our duties in this respect have been faithfully discharged. Before I conclude, it is perhaps necessary that I should state that the most friendly understanding exists between ourselves and the Great Central Gas Company; and, from the spirit manifested on both sides, I cannot anticipate that there will be any alteration of that state of things. But while I allude to that company I cannot forget that, in order to establish themselves in the City of London, they submitted to a maximum price to get their bill through Parliament, which maximum price is insufficient to give them a permanent good profit. If by any arrangement, which must be a prospective one, we could only be placed in a similar position to every other company in the metropolis, we should return to a state of comparative prosperity. While our price remains at 4s., and the price of coals is so much greater than when that maximum was fixed, and the cost of labour and materials so much increased, we cannot do much; but if we could get 4s. 6d., that would make us go on to a very flourishing state. Let me say, before I sit down, that as long as we continue in the direction of your affairs, our most unwearied attention will be to promote your interests in every way possible; and no man can be responsible for what is beyond his control. I can assure you that there has been no wasteful expenditure on the part of the directors, and we believe that at no distant day we shall meet with our reward. My worthy friend, the deputy chairman, has reminded me that one source of additional expense to us since the establishment of the Great Central Company is, that we, like them, now supply meters gratuitously, and they have stood us in £15,000; in addition to which we have to repair them at an expense of £600 a year more. The chairman concluded by moving the adoption of the report.

The motion having been seconded,

A PROPRIETOR inquired whether he understood rightly that the balance was £3319?

The CHAIRMAN: Yes, that is the sum carried down, because there was an undivided balance last half year.

The report was unanimously adopted.

Mr. T. TYRRELL then moved, in accordance with the recommendation contained in the report, "That a dividend upon the capital of the company, at the rate of £2 per cent. per annum for the last half year, be now declared, free of income-tax, and that the same be payable on the first Tuesday in May next, between the hours of twelve and one o'clock, and on each succeeding Friday and Tuesday, between the same hours." In moving this resolution, he felt that, although every proprietor must lament the circumstance that the amount of dividend was not larger, they must all rejoice in the prosperity of the company during the past half year, which prosperity was obvious to the most superficial observer. It was evident, from the accounts which had been presented and the report which had been read, that, although they were supplying gas cheaper than any other company, the Great Central excepted, yet that, but for unavoidable and unanticipated expenses, they would have been able to declare a dividend at the present meeting large enough to satisfy the most sanguine amongst them. This fact, he was reminded by an honourable proprietor who sat next him, was corroborated by the amount of the dividend declared at the last half-yearly meeting; and, apart from that, it was clear from the accounts now rendered.

Mr. FENN seconded the resolution, which was carried unanimously.

A PROPRIETOR inquired why the dividend was payable in May instead of March?

The CHAIRMAN said, it would perhaps be necessary for him to explain why the committee had substituted May for March. The reason was that, although they got in sufficient money in time to pay the dividend at the earlier date, yet, as the amount subscribed towards the trust fund was not sufficient to meet current expenses with comfort to themselves, the committee thought it right to defer paying the dividend until May. Of course, if they found themselves able to pay it before, the proprietors would be apprised of the fact.

Mr. TYRRELL next moved the appointment of an additional collector, at a salary of £135 per year. He said in doing so he would call the attention of the proprietors to the remarkable corroboration which the necessity for this resolution gave of the observations he had previously offered as to the real prosperity of the company, although the extraordinary expenditure of the past half year had materially diminished their dividend. The necessity for this appointment arose from the fact that the rental of the company had largely increased, and the collection of their revenues required an additional officer.

Mr. HENDRIE thought it was not necessary to take a formal vote of the proprietors on the subject. The committee could make the appointment themselves.

The CHAIRMAN explained that the act of Parliament required the vote of the proprietors in all appointments the salary of which exceeded £100 a year.

Mr. HENDRIE objected to the payment of a fixed salary to a collector, and thought his remuneration ought to be a per centage, otherwise he was likely to be careless in getting in the rentals.

The CHAIRMAN said the payment of a fixed salary was found to work better. That was his experience, too, in other companies. The expense of collection was not at the rate of more than £1 per cent.

A DIRECTOR: And our bad debts are comparatively light.

The resolution was then adopted.

Mr. HARDWICK said, before Mr. Gray left the chair, he wanted to ask one question with reference to what had fallen from him about the £30,000 trust-fund. He did not wish to have the names of proprietors who had not contributed read, but, as the chairman had told them generally the number of shares held by such proprietors, he would like to be informed further as to what was the actual number of proprietors who had contributed to the £23,930.

The CHAIRMAN: About 60.

Mr. HARDWICK: And what is the total number of proprietors?

The SECRETARY: 190.

Mr. HARDWICK was afraid that the question would be answered in that manner. Out of 190 only 60 proprietors had responded! Now, although they must all regret the diminution of the dividend, yet, as men of business and reasonable men, they could not but deem the report and accounts as most satisfactory. The first point, the point of most importance in all concerns, whether public or private, was to see that the business had not fallen off. Here, on the contrary, they found that the business of the company had much increased, and was in a most healthy condition. Of course, with them the expense of labour, and the cost of repairs, and the erection of machinery, fell more heavily than it would do supposing they had more extended premises and more open ground than they actually had. But the business had increased, as they had the satisfaction of knowing; and they must be sure that the directors could not be expected to carry on the affairs of that establishment unless they had that support given them which was inevitably needed. The proprietors had heard for the first time that the Tower was to be lighted with gas. No doubt, the consumption would be considerable; and, as it had fallen to the lot of this company to light that institution, they would find a handsome addition to their revenue from that source. But it was a moral impossibility, and they must not expect that the directors, in whom they placed great confidence, and which confidence they had well deserved by their unwearied assiduity and diligence in managing the affairs of the company, should be able to go on unless liberally supported by the proprietors. His object in making these remarks was to induce every gentleman present to come forward and relieve the company from the want of funds. The circumstance which had mainly caused the falling off in the dividend had been most satisfactorily explained, namely, the reconstruction of the bunch of retorts. That work had been done exceedingly well; advantage had been taken of the new system of building retorts, and the company would reap the benefit of the outlay. He would not take up further time, but simply move a resolution which expressed the opinion of the meeting, that the continued increase of the company's business, as shown by the successive reports of the directors, indicated the importance of contributing the remaining £7000, so as to complete the £30,000 agreed to be raised at a special meeting of the proprietors, and calling upon those who had not contributed to do so forthwith. Having read the terms of his resolution, he concluded by saying, that he did not know that he could urge anything more in support of its adoption than what he had stated, and expressing a hope that it would be responded to by a large number of the proprietors.

Mr. HENDRIE seconded the resolution, which was put and carried.

Mr. Gray having vacated the chair, Mr. TYRRELL moved, "That it be filled *pro. tem.* by Mr. Hardwick," which was cordially agreed to.

Mr. COOK then moved a vote of thanks to the committee for their past services. He expressed the obligations which he felt to them, and in which he was sure the proprietors all sympathised, for their great exertions, and the zeal and ability they had displayed in the management of the affairs of the company. Although the report read was not in some of its aspects so favourable as they could desire, they all felt that the committee had done their duty, and as such deserved the acknowledgments of the shareholders.

Mr. LEARY seconded the resolution, which was carried unanimously.

On the motion of Mr. TYRRELL, a vote of thanks to the auditors was also adopted.

The directors, Messrs. Gray, Sangster, Cousins, Hadland, and Curling were

then re-elected the committee of management—Mr. Gray resuming his office as chairman, and Mr. Sangster as deputy-chairman.

In communicating to Mr. Gray the vote of the meeting re-electing the committee, Mr. HARDWICK said: Allow me, sir, in the nameof the gentlemen present, and also of the absent proprietors, to assure you of our unbounded confidence in the zeal, assiduity, and attention with which you will, as you have hitherto done, watch over the interests of this company. I trust your lives will be prolonged for many years to come, to witness the success of your exertions.

The CHAIRMAN (Mr. Gray), on resuming his seat, said, his first duty was in his own name, and in the name of his colleagues, to express the gratitude they felt to the proprietors for electing them again to the responsible situation they had so long filled. He felt that he need hardly say to the meeting that the committee were prepared and willing to do all in their power to give the proprietors a better dividend next half year; and he (the chairman) would be cruelly disappointed if the hopes he had expressed in reference to it were not realised.

Mr. SANGSTER said there was one item which the chairman had omitted to mention, but which was a cause contributing to the diminution of the dividend. The fact was, that when he (the deputy-chairman) first became a gas-maker, the process was a very simple one, and the purification was also a very simple matter; they had only to make use of a little water and lime, and their business was done; but now chemistry and science had been introduced, and, whatever else the result might be, the expense was greater. They had now brought clay retorts into use, which, though more durable, were more expensive; and they had been obliged to have resort to exhausters, which, in the case of this company, required the aid of four steam-engines, and involved the consumption of a large quantity of coke, and the employment of qualified engineers. In addition to that, they were obliged now to purify through a different medium than lime and water—a material of an expensive description, viz., the oxide of iron, which was a source of great expense and labour; and these things together tended very much to reduce the profit on the manufacture of gas.

A vote of thanks to Mr. Hardwick for his temporary occupancy of the chair was then taken, and Messrs. J. Lamb and J. T. Hadland were re-elected auditors for the coming year.

Mr. TYRELL moved, and Mr. HARDWICK seconded, a resolution appointing Sir Charles Price treasurer of the company.

The CHAIRMAN, on putting this resolution, said he sincerely trusted that such an alteration would take place in their finances that Sir Charles Price would be the treasurer in reality, for heretofore the company had sometimes been his treasurer. The resolution which had that day been adopted would, he hoped, effect an alteration in that respect.

The motion having been adopted, the meeting separated.

ROYAL POLYTECHNIC INSTITUTION.

LECTURES ON COAL AND COAL GAS.

By LEWIS THOMPSON, Esq.

Mr. PEPPER having introduced the distinguished lecturer to the meeting, Mr. THOMPSON commenced by observing, that although everybody was supposed to know what coal was, he felt that it would be necessary for him to describe it. No subject was, perhaps, more familiar to the public mind than coal, yet it did not unfrequently happen that the most learned failed to recognise it when he saw it. The difficulty arose from the great variety it presented, and the dissimilarity existing between the different kinds of coal. For example, this was an article (exhibiting a piece of Boghead cannel coal) upon which important disputes arose—the question being whether it was coal or not. On striking it, it sounded like a piece of wood, but it was, however, the celebrated Boghead coal. The greater part of the scientific men of the day had been engaged in determining that fact, and for a long period the scientific men of this country were nearly equally divided on the subject. Among practical men also a difference of opinion existed. Some time ago a Government ship, touching at the Island of Disco, shipped a large quantity of what they supposed to be coal. They took in a much larger quantity than was supposed to be necessary, and the result was, they performed their voyage in a satisfactory manner; but had they not taken in more coal than at the time they thought necessary, they would have fallen short of fuel in the voyage, owing to the great difference between the heating powers of the Disco coal and common coal; therefore coal was not a thing so easily understood as some people imagined. The origin of fuel, or fire, was itself very difficult to ascertain; indeed, we had no data as to when fire was first used by mankind. Cook, in his voyages, found in one place a savage people who did not use fire. Some of the aboriginal inhabitants of New South Wales, when Cook went on shore, in preparing some victuals, he placed a pot over a large fire, and placed a fish in the pot. When the water was boiling, the savages thrust their hands into the pot, and of course were scalded. They immediately came to the conclusion that there was a god in the pot. Such was their ignorance of fire and its properties. We derive very imperfect notions as to the origin of fire from the ancients; they supposed that Prometheus stole it from Heaven. It was difficult to ascertain how man first arrived at a knowledge of the use of fire. He might have obtained fire in the forests, where the trees often ignited in consequence of the friction occasioned by the agitation of the wind. Amid the conflicting theories on the subject, we were still ignorant with respect to the first introduction of fire. One thing was certain, that for many ages wood alone was used. It was only in later times that coal was introduced, and it was surprising that we had not a better account of the circumstances under which it was introduced. It might be supposed that the early Britons must have become acquainted with the use of coal, but facts had a tendency to lead us to a different conclusion. It was a singular circumstance that the locality in which the Romans ultimately fixed themselves was a coal district. The Romans, as is well known, built a large wall to protect themselves from the incursions of the inhabitants of the northern part of the island, and immediately beneath the termination of that wall were discovered the most valuable seams of coal, and which supplied the first mines that were worked. In consequence of that circumstance, the coals of that mine received a designation from the wall; hence the expression, "Walls-end coal"—the end of the wall, because they were found at the end of the great wall. The earliest account of the use of coal was somewhat interesting. The first manuscript from which we derived information on this subject was dated 1195. At that time a feudal lord, living in the north of Durham, granted to a blacksmith at Bishopwearmouth twelve acres of land, with the right of working the coal therein, to enable him to carry on his business. The next was a charter of Henry III., dated December 1, 1239, to the people of Newcastle, for digging and selling coals called "carbo-maris." An historical work, dated 1245, mentioned the article under the term "sea-coal;" and in that work mention was made of "colliers or pitmen." From that time forward the consumption of coals gradually increased. In 1327 coals had become quite common in London; indeed, so much so as to excite the cupidity of the Government of the day. The consequence was that a tax of 2d. per chaldron was imposed; and, recollecting the value of money at that day, and that the price of the chaldron was only 6d. at Newcastle, that tax was enormous, and, no doubt, severely felt. In the time of Henry VIII. the price of coal rose to 1s. a chaldron where it was produced, and in London to 4s. That was the Newcastle chaldron, which was double the London chaldron. Afterwards, in 1330, the abbot of Tynemouth priory let a mine for £5 a year, which rent in a short time was increased to £50 a year. Queen Elizabeth imposed excessive restrictions on the coal trade, and also a heavy tax upon coal. Charles I., during the civil war, finding it necessary to raise money by any means he could devise, sold coal to the Dutch for gunpowder and bullets to shoot his own subjects. He raised the tax upon coal to such an enormous amount, that the consequent rise in the price of coal led to such riots in London that an end was put to the enormous impost. We recently had an agitation in this country about the consumption of smoke—an agitation approved of and sanctioned by Lord Palmerston, and supposed, erroneously, to be the first of the kind. A similar agitation occurred so early as 1306, when the consumption of coal was prohibited in consequence of the smoke and soot thereby engendered, these being considered injurious to the inhabitants. A second edict was passed, ordering the consumption of coal to be prohibited under severe punishment; but such were the evident advantages of coal, and the general desire of the people to consume it, that no notice was taken of the edict by the public. Twenty years later we found, by the registers of the royal kitchen that had been preserved, that coal was largely burned in the palace itself; so that the manifest advantages derivable from the consumption of coal had overcome every obstacle. (Hear, hear.) He would take occasion hereafter to make some observations on the late measure of the Government for the consumption of smoke, but at present he would briefly consider the circumstances connected with the formation of coal. Two or three theories had been propounded with respect to the formation of coal. One of these was that coal was formed from lignite, or the principle of wood. He (Mr. Thompson) did not altogether approve of this theory, for the heating power of wood was but trifling compared with that of coal. In fact, the heating power of coal was three times that of wood. Those who vindicated the wood theory did so by a fanciful arrangement of the atoms in a diagram, by which you might come to almost any conclusion you pleased; but, in his opinion, there was nothing to show that wood originated coal. He thought we must look for its origin elsewhere. We often found small means originating great results, and it was to small matters he looked for the origin of coal. And here he might observe, that all aquatic plants, more especially the mosses and lichens, contained on their surface a large quantity of fatty or waxy matter, which enabled them to resist the influence of the moisture to which they would otherwise be exposed. Those plants were furnished with a natural protection similar to that which the ducks enjoyed. The aquatic plants, although they lived in the water, owing to the protection of this peculiar substance, never touched the water; in fact, like the ducks, they were never wet. Just as the duck's back is guarded by a peculiar oily substance, common to that class of animals, and by which they were enabled to plunge into the water without being wetted, so aquatic plants, by means of this oily and waxy matter which covered their surfaces, were naturally sheltered from the effects of moisture. A similar process appeared to be going on in peat bogs; and here was a kind of a mossy vegetation in progress, on the surface of which a similar natural oily substance was placed. In the decay of ligneous matter, humic acid was generated, and it was necessary that this acid should pass away, in order to leave those properties necessary to produce a heat-giving or luminiferous substance. If the humic acid disappeared, the waxy and fatty matters would remain, and then, in the course of many years, would form a bed of coal. In imitating the process which Nature adopts in these respects, he thought there was no great difficulty. There were several acids which had the power of destroying woody or ligneous matter, but which did not act on waxy or fatty matter. One of these was muriatic acid. If you took a quantity of peat moss, and exposed it to the action of muriatic acid gas, the lignine would be converted into a soluble matter, which might be washed out, while the oily substance remaining would be almost identical with common wax.

The lecturer then produced two small candles, one made from the wax of the *equisetum* or horse-tail, and the other from the common moss—a plant which, he said, tended considerably to the production of the coal formation. The candles were by no means well made, but sufficiently so for an experiment. When lighted, they produced a flame sufficiently luminous to justify Mr. Thompson's theory, and the experiment was loudly applauded by the audience.

The lecturer then proceeded to show that, where large vegetation of this kind was going on, there could be no difficulty in supposing that in process of time a large amount of waxy or fatty matter would be collected and constantly carried down to the bottom of the water, and covered over by an argillacious deposit; and by those means a seam of coal might be formed. If that were a true account of the origin of coal, then it was clear that there would be different kinds of coal, differing according to the nature of the plants from which they were produced, and the fatty matter with which those plants were covered. Cannel coal appeared to be derived more from fatty than resinous matter, while Newcastle and bituminous coals appeared to be derived from resinous matter. He had referred to the agitation now going forward about the consumption of smoke, and he thought he might here appropriately make some remarks on the conduct of the Government at present, with reference to its interference with industry as regarded the consumption of smoke. That was a subject of great importance, and which was deserving of attention. The manufacturers of this country were unquestionably entitled to every consideration, as contributing so much to its wealth and importance, and nobody could doubt that unjust interference with their industrial pursuits was calculated to inflict serious damage on the community at large. At present, the success of English manufacturers was not owing to the fact that they made articles better than foreigners, but that they made them cheaper. An instance of this kind had been recently mentioned to him in Paris. A most eminent French gentleman, who had been in England, had expressed his astonishment at the cheapness with which Englishmen could dispose of their manufactures, and in illustration of his remark, he produced a small box of steel pens. This little box was elegantly prepared; it was nicely ornamented, and contained a gross or 12 dozen of steel pens, and cost only five sous (2½d.); and he remarked that, if those things grew like blackberries on the bushes in France, the French people could not afford to gather them, put them in such elegant little boxes, and sell them at such a low price. Of course we were enabled to do this in consequence of the low price of fuel in this country. If we had not had an abundant supply of fuel so as to give us a perfect command of

machinery, we should be soon excluded from the foreign markets; for whatever contributed to increase the price of the manufactured article, will tend to drive us out of the foreign markets, by bringing foreigners into competition with us. Any obstacle, however trifling, that might be placed in the way of manufacturing industry will tell, in time, most injuriously upon our commerce. With respect to many articles at present produced in this country, our national advantages are so trivial, that we should soon be completely shut out, if any increase were made in the cost of production. He, Mr. Thompson, regretted to say that the restrictions recently proposed by the Government were of that class that tended to raise the price of articles manufactured in this country. A man was compelled to burn his own smoke, as it was phrased. He was told, of course, that in this process he would be paid for the trouble; but practice showed that no conceivable benefit could arise from it; for the cost, the trouble, and the difficulty of getting workmen to operate on the principles laid down for them, were calculated to enhance the price of the manufactured article; besides, such a regulation must necessarily place the master at the mercy of the workman. A workman might make a smoke, or he might not; and if any quarrel arose between the master and the workman, the latter might easily get his master fined, and put him to great expense by creating a nuisance, for which the workman, not the master, was morally responsible. This was not only the case with regard to what was called the smoke nuisance, but to many other alleged nuisances; and it was to be deeply regretted that a Government which, in many other respects, seemed inclined to act for the best interests of the country, should, in this respect, have lent itself to a project which must have a most damaging effect upon trade and commerce. With respect to smoke, it was said that it was injurious to the health of the inhabitants; but, if that were the case, we might expect a larger rate of mortality in towns where coal was abundantly consumed, than in places where no coal, or but very little, was used; but it was found by experience that the very reverse was the case. The mortality in London was much less than in Paris, or most of the continental towns. To him it appeared to be quite rediculous to suppose that the smoke from coal had, in any degree, contributed to the mortality of the inhabitants; on the contrary, he thought it likely to diminish the amount of mortality: indeed, he was of opinion that in many cases it would have that effect. It was well known that "carbon" was a most valuable agent in purifying water and other matters; might not the air also be purified by the minute quantities of carbon which fall in the shape of soot? If this were the case, then many diseases which afflicted large towns might be prevented, or at least greatly diminished by the presence of that smoke, or soot, which so many people appeared so anxious to get rid of. It was a very remarkable circumstance that Birmingham, where an enormous amount of coal was consumed, had never been visited by cholera, although that disease had attacked neighbouring towns, where there was comparatively little smoke. The consumption of smoke might be effected, no doubt, by other means than any of those hitherto suggested. The great difficulty in the consumption of smoke was, that the flame in rising came in contact with the boiler, and was cooled down, so that a large amount of carbon was deposited; but if the flame were brought into contact with a body heated to a high temperature, no doubt the carbon would be consumed. Some of the plans proposed for the consumption of smoke had been based on that principle, but he was not aware that anything had been done yet which had fully answered the purpose, nor did he think that any coercive measures could be adopted that would lead to the consumption of smoke in that way. As regarded the heating powers of coal, we had had many discrepant statements. Not many years ago the Board of Admiralty instituted several experiments, at great expense, with a view of ascertaining the heating powers of different kinds of coal; but, though those experiments were made, no doubt, with great care, yet they were conducted in so partial a manner that the result turned out to be unsatisfactory. The experiments, instead of having been made with different kinds of boilers, according to the different qualities of coal, were all made with one particular kind of boiler, whereas different coals required different forms of boilers to develop their respective heating powers. The form of steam-boiler employed by the Admiralty in those investigations, though very well adapted to test the heating powers of anthracite coal, was singularly defective—in fact, absurd, when used with other descriptions of coal. At the present moment the greatest confusion prevailed with regard to the heating power of coal. He had himself made many experiments upon the subject, and was satisfied that the heating power of coal had been much underestimated; and this was mainly owing to the kind of furnace employed. The common form of furnace permitted the flame arising from the coal to pass immediately on to the cool surface of the boiler, and by the carbonaceous deposits made on the boiler there was an immense loss of heating power sustained. Probably not more than half of the real heating power of any coal, according to the present system, was ever obtained. He thought he might safely say that we lost one-half the heating power of the coal at present consumed; and, if we estimated the amount of coal consumed at 40,000,000 tons annually, and the price at 10s. per ton, then we shall lose £10,000,000 annually, which we throw into the air in consequence of the bad construction of our furnaces. The French invented a plan for ascertaining the heating power of coal. They mixed the coal with litharge; and then it was supposed that the carbon of the coal would so operate upon the litharge as to determine the heating power of the coal. He had tried such a mixture himself, but he did not think it was a good plan; indeed, all the experiments that had yet been tried proved failures, and the consequence was that very little was known at present of the heating power of coal. He had invented a little apparatus which he thought was likely to be useful in this respect; but, before he particularly alluded to it, he would solicit their attention to the difference that existed between coal and a substance which had frequently been taken for it. He had said before that a Government vessel, touching at the island of Disco, had shipped a large quantity of lignite, supposing it to be coal. He had then a sample of the lignite in question from the island of Disco. Now, if he introduced a portion of this into a test tube, and added a quantity of the solution of potash, if it were lignite, he should get from it a deep brown-coloured fluid; the potash would act upon the humic acid in the lignite, and form humate of potash; but, as there was no humic acid in pure coal, such an effect could not be produced. He had said that humic acid escaped from peat, and lignite was merely peat in a further advanced state of decomposition; it was much older than peat, as coal was older than lignite. Lignite stood between peat and coal, and contained a quantity of humus, which had not had time to escape; and it was by the presence of this acid that he was able to detect the difference between lignite and coal.

The lecturer then performed the experiment, and the result was as he predicted. The liquor was as black as ebony, whereas the coal would leave the liquor perfectly clear.

It was in this way he could distinguish whether a substance of this description was coal or not. The lignite in this country was confined to the south and south-east. It was not coal yet, but no doubt would become so after the lapse of years.

The lecturer then experimented on the lignite of Devonshire, and the result was exactly the same.

If a steam vessel, at a great distance from this country, was in want of coal, it might be able to supply itself with lignite; but the commander would not be able to know how much he would require, unless he were able to determine the heating power of lignite. He would now call attention to an apparatus for determining the heating power of coal. The construction of the apparatus was based on a well known fact, namely, on the latent heat of steam. Water, it was well known, could not be raised to a higher temperature than 212°, which was the boiling-point, after which it was converted into steam, and the heat which passed into the steam would be very great indeed. In common language, we expressed this in the degrees of Fahrenheit. One part of water, in becoming steam, combined with 967° of Fahrenheit's scale. Now, if one grain of coal would heat 967 grains of water one degree, then one grain of coal would boil off its own weight of water. If it heated 967 grains of water two degrees, it would boil off twice its weight of water; and so on. Upon that principle, Fahrenheit's scale became a very simple instrument for determining the heating power of coal. He had a vessel before him which contained 30 times 967 grains of water, that is to say, 29,010 grains. With this he employed 30 grains of the fuel in question, 30 grains holding the same ratio to 29,010 that 1 grain held to 967; so that, if those 30 grains heated the water in the vessel 1 degree, then they would boil off their own weight of water; if they heated it 2 degrees, it would boil off twice its weight; so that he had merely to burn the coal under the water, and the indication of the thermometer told him the quantity of water a pound of that coal would evaporate. Now, in order to burn the coal under the surface of the water, he must burn it with oxygen gas. In this there was some little difficulty to be overcome. The material he employed in generating the oxygen was chloride of potash. One grain of this would furnish a cubic inch of pure oxygen gas. By the use of this material, perfect combustion was certain—the proof of which, he might observe, was that the water exhibited no black particles; there was no smoke nor black particles of carbon floating about. There was, however, a portion of black matter always given off from the copper vessel in which the coal was placed. An oxide of copper was formed on the surface of the vessel. This sunk to the bottom of the vessel, and might be dissolved afterwards by a little nitric acid, so as to convince every person that the combustion was complete. If he mixed 7 parts of chlorate of potash with 1 part of coal, or 30 parts of coal with 210 of chlorate of potash, he obtained a result sufficiently near perfect combustion. In fact, he employed ten times the quantity of chlorate of potash to ensure perfect combustion.

The lecturer then, having made the mixture, and having added a little nitrate of potash to modify and regulate the combustion, the apparatus was put into action with the kind of coal called Tanfield-moor. The effect was both pleasing and instructive, the combustion being quite perfect, though carried on under the surface of the water; and the result showed that this coal is capable of boiling off 15·8, or nearly 16 times its weight of water. Similar experiments were made upon coal from Valparaiso, and lignite from Disco, the latter of which proved capable of boiling off only 9¼ times its weight. Much applause followed these experiments.

Second Lecture.

Mr. Thompson, who was most warmly received, commenced his lecture by observing, that in the observations he had the honour of making on the subject of "coal and coal gas" on the last evening he addressed them, he stated that more than one-half of the heat of coal was lost to them in practice, although they had done a great deal in improvements, and applying the best form of steam-engine boiler, and done their best to secure the whole of the heat. That remark also applied to their common hot-hearths and stoves, by the use of which they lost nearly three-fourths of the total quantity of the heat evolved by coal. The mode they had—he might say the only mode of obtaining the heat from a common stove—was by radiation; a process which differed very considerably from conduction, and was altogether another mode of applying heat. There had been several improvements and alterations made in their common stove to remedy the defect to which he had alluded. For instance, in the Silvester stove a large quantity of bars projected from the front, and increased the radiation; and he did not know why this stove was not more generally used; but perhaps it was the difficulty experienced in cleaning, and its liability to get out of order. In the Belgian stove, they had nothing of the appearance of a real English fire. In that stove the fuel was burnt, but could not be perceived, although a greater amount of heat entered the room. From the prejudices against it on that account—and prejudices which he confessed he agreed in—it was not much or even scarcely used. The people of England preferred the old system, for there was certainly a great deal in the appearance of a fire, which added to the comfort and pleasure of a room; there was even a pleasure in "a stir of the fire"—(laughter)—so that, upon the whole, he was afraid they were likely to continue upon the old form. The Belgian stove had also another defect; for the air, coming in contact with the heated portions of the iron, had the effect of producing a most unpleasant and disagreeable odour in a room. This resulted from the animal and vegetable matter which was floating in the atmosphere being burnt; for they could easily discern, when a beam of sunshine plays in a room, something floating about in the air; and this, of course, coming in contact with the heated iron, caused a highly offensive smell. One of the latest improvements was Dr. Arnott's stove, which effected more perfect combustion, and gave forth greater heat in consequence of the coal being introduced in the bottom of the grate. It was assisted by radiation, and the whole of the gaseous matter of the coal was acted upon, and they got a fine bright fire; but the difficulty of introducing the coal at the lower part of the grate was considerable; and, in consequence, Dr. Arnott's stove was furnished with machinery, by which the coal was screwed up. He considered that would prove injurious to the stove, as few people would wish to be incommoded by the screwing process. Another stove had been lately patented; but the patent was not as yet specified. Dr. Backhoffner was the gentleman, he believed, who had some connection with it. In this stove the coal was introduced into the middle of the grate. It was said that greater combustion was effected by this mode, and that less coal was consumed. As to the success of the improvement he could not say, nor would he express an opinion upon it, not having as yet seen it; but that great improvements were likely to take place was possible. They wanted a something that would give them the whole advantage of their fuel, without losing all the comforts they all liked to see in an English stove, and to which they were accustomed from boyhood. Coal had been long distilled in two ways; because, although they had not been acquainted until lately with one of the modes, yet it was much older than they were apt to consider. Distillation of coal was

one of the oldest processes as applied to coal. Not more than five years ago. Mr. Young took out a patent for distilling coal at a low red heat, instead of a high temperature, which was the present mode. But that gentleman's attention had been drawn more especially to the oils which were found in coal. He had been proprietor of a spring where this oil, or petroleum, was found, and which was largely used as a substitute for spermaceti oil in machinery. This spring ceased altogether to yield any oil, and Mr. Young was thrown upon the resources of science to discover a means of procuring it. It was evident to him that this oil came from coal, as it percolated through the coal seam; however, he set himself to work, and being well acquainted with science, he was not very long in discovering that coal could be so acted upon as to give very little gas, and a large quantity of this oil, or petroleum. He took out a patent, and was successful. The coals he now distils from are the Scotch cannel coals; the Boghead coal especially afforded him a large quantity of that oil which was now generally used as spermaceti oil. He (Mr. Thompson) believed the day was not far distant when the spermaceti whale would be numbered with "things that were," for that animal was disappearing from its native element, and daily becoming more scarce. In a short time spermaceti oil would become fabulous; at present it was one of the scarcest oils in the market. It had been largely used by our cotton manufacturers, who now were compelled to use the coal oil. It was not very often they heard of a scientific man making a fortune; but he was happy to say Mr. Young had realised a large one. This, however, was an old discovery; for, in 1780, Lord Dundonald, the father of the present Lord Dundonald, took out a patent for the very same thing—the distillation of coals at a low temperature, with a view of procuring the oil. But it should be borne in mind that all kinds of coals were not well suited for this purpose; and Lord Dundonald did not so well succeed; he did not understand the value of his own discovery, or he did not carry it thoroughly into practice. The next kind of distillation was one well understood; that was, the process of procuring coal gas, and separating it from oils and other combinations, which had been carried on for the last forty years; and, although it had passed through many phases, and many difficulties beset it, it has reached a considerable degree of perfection. In the manufacture of coal gas two kinds of coal were used, and the gas companies in London made two kinds of gas—common coal gas and cannel coal gas. Cannel coal gas possessed a higher illuminative power than common coal gas, and was sold at a much higher price. The common coal, however, was much more generally used; and there was every reason to suppose that, were cannel coal generally used, they would not be enabled to obtain a sufficient supply to satisfy the demand. Now, when either kind of coal was thrown into a retort of a high temperature—for it required the retort to be of a "cherry-red"—that was, the retort required to be as red as a cherry, and even a higher temperature for cannel coal; and under these circumstances the elements of the coal were divided and separated, and took new forms and combinations—a greater part of the coal remained in the retort in the form of coke, whilst the hydrogenous portion, combined with a variable quantity of carbon, passed off in the form of gas, and vapours arose in the form of tar; and, as the coal itself contained sulphur and other impurities, they remained in the gas; so that gas, in coming from the retort, was technically called "impure gas." Several methods had been adopted to deprive gas of these impurities, one of which was to allow it to pass into a condenser—a series of large pipes kept cool. The consequence was, that the gas became cooled, and the tar and non-volatile matter fell on the sides of the condenser, and trickled down into a receiver below. Still sulphur remained in the gas, and they required to remove that by a separate process. The oldest method was to pass the gas in this state through common slacked lime contained in a vessel called a purifier, by which the impurity combined with the lime; but when in this state, a considerable amount of sulphur was evolved on opening the purifier, causing a most unpleasant odour in the air, and this gas-lime had become a perfect nuisance, which threatened to stop the manufacture of gas altogether. Now, in questions of this kind, it was an object of no small interest to remark how constantly the occurrence of an impediment gave birth, as it were, to the means of its removal. Not many years since the King of Sicily imposed an unwise restriction upon the exportation of sulphur to this country, which, so far from proving injurious to our interests, as was expected, only led to the discovery that in Ireland we possessed a source of sulphur larger than that of Sicily itself. Again, in the scarcity of spermaceti oil, it had been shown that a substitute could be procured from coal; and so with lime purification, no sooner was the defect perceived than improvement took place, and supplied us with a substitute. About fifteen years ago a Mr. A. Angus Croll took out a patent for purifying gas by means of the oxides of manganese, iron, and zinc, in place of lime; and it is now extremely difficult to understand how it happened that he failed to carry out his invention to its ultimate limit—nevertheless he did fail to do so. Probably his chemical knowledge was defective, or, like Lord Dundonald, perhaps he never thoroughly saw into the merit of his discovery; in fact, we may safely conclude that he never even really employed it, otherwise he could not have overlooked its immense advantages. Had he properly carried it into practice, we should now have been at least fourteen years in advance of our present position in the art of purifying gas. Although thus lost to Mr. Croll, and for a time to the manufacture of gas, the idea of using these metallic oxides, instead of lime, was not lost to society. A Mr. Laming, then residing in Paris, amongst others took notice of Mr. Croll's patent, and guessed at its real value. He took out a patent in the year 1847 for the use of oxide of iron as a means of purifying gas. Now that was precisely Mr. Croll's invention, who used oxide of manganese, iron, and zinc, as agents in the purification of gas. Mr. Laming patented their use in combination with another substance called muriate of lime; and he not only undertook to remove sulphuretted hydrogen, but also ammonia, from gas, and in that he perfectly succeeded; and so far the only question remained, as to the relative cost of his process compared with lime. The invention was tried at the Westminster station of the Chartered Gas Company, in the year 1849, and it was found perfectly to succeed; but there was one disadvantage—it was found that oxide of iron was more expensive than lime; but the expense of this did not seem likely to prevent its introduction. However, that introduction would have been retarded, had not another discovery been made. In the use of the oxide of iron, as patented by Mr. Laming, it was found that, although preparatory to being used it was perfectly red, yet afterwards it became as jet black as coal; and then, according to Mr. Laming's patent, it was to be taken out of the purifier as useless, and he did not intend it should be used again. The superintendent of the Chartered Gas Works had directed it to be put aside, and in three days it was found to have changed colour, and, from being a jet black, to have resumed its natural red colour again. This fact struck the superintendent, Mr. Evans, and he determined on using it again, which he did, and succeeded. Now, this was the discovery that gave value to the process of purifying gas by Mr. Laming's patent; for the oxide of iron, unless it could have been used over again, could not compete with lime in point of price. It was now found to be cheaper than lime, and could be used for more than twenty times. Berzelius supposed that oxide of iron was in some way or other connected with respiration—that it was essential to the process—and this discovery tended to confirm his supposition; for they found that iron passed from one state to another in the lungs, exactly as in the gas purifier. Thus in the veinous blood it was black, as if in the state of protoxide, whilst in the arterial blood it was red, as if in the peroxidised condition: so in the purifier it became black from the impurities of the gas, and on exposure to the air it became red, like the blood in the lungs. It seemed, therefore, to perform with the foul gas the same action which Berzelius supposed it to perform upon the impure or veinous blood of animals; at all events, they found that it succeeded in purifying gas. (Applause.) Many of the companies throughout the country had adopted this plan. Ammonia, or hartshorn, as it was commonly called, was an impurity generated in the production of gas; and it appeared to him to be the greatest mistake upon the part of a company not to remove this ammonia: it was now largely used in agriculture, as they must be well aware, and was one of the best fertilisers known. Before making any remarks upon the purpose for which gas was manufactured, that of giving light, it became necessary to say a few words upon the subject of light. The light of the sun passed with great rapidity from the sun to the earth; it illumined everything that it came in contact with, and was extremely brilliant; its intensity was great; and hence it acted as a stimulus to the growth of vegetables, for they would not grow in the dark, nor in light of low intensity, such as terrestrial or artificial light. The lecturer then proceeded, at much length, to explain the difference between the light of the sun and artificial light—as gas, candles, &c., and illustrated his arguments by several interesting experiments, which proved not only that artificial light is the product of heat acting on solid matter, but also that light, like electricity, possesses the two very different qualities of *quantity* and *intensity*. That light is the result of heat exhibited on solid matter, was shown in a variety of ways: by the flame of hydrogen, as a source of heat, acting on solids, such as platinum wire, asbestos, and magnesia; by the combustion of phosphorus in oxygen, with which it forms a solid, and evolves much light; and by its combustion in chlorine, with which it forms a fluid, and yields no light. Lastly, the oxyhydrogen, or lime-light, was displayed where the intense heat of the non-luminous flame is made to act on solid lime with the production of a light of great intensity, but, as was obvious from the darkness of the shadows, possessing but small quantity. The lecturer next explained the difference betwixt quantity of light and intensity. Every particle of solid matter, when heated to incandescence, evolves light, and the intensity of this light is proportioned to the degree of the heat: thus the oxyhydrogen flame, acting on a few particles of lime, generated a most intense light. Quantity of light, however, depended not upon the degree of heat to which the particles of solid matter were subjected, but upon the number of particles raised to the temperature of incandescence: thus one inch of platinum wire, heated white hot, would evolve a certain *quantity* of light of a given *intensity*; and two inches similarly heated would evolve twice that *quantity* of light of the same *intensity*—the quantity being doubled whilst the intensity remained the same. In this way we were easily able to understand how it happened that a source of light so powerful as to be absolutely painful to the eye might nevertheless produce a smaller illuminative effect than a flame of comparatively much less power. The electric light, for example, was notoriously an imperfect mode of lighting, even if its cost permitted its use. Mr. Thompson then entered upon the subject of gas illumination, with a few remarks concerning the explosive nature of coal gas, and, reverting back to the origin of artificial light, exhibited an instrument formerly used by the miners for the production of light in situations where the air of the mine was charged with "fire damp," or explosive gas. The instrument was called a "steel mill," and consisted essentially of a wheel of steel, which was made to revolve with great rapidity against a piece of flint; the heat produced by the friction ignited the small particles of steel or solid matter, and thus produced light. This instrument was used by a boy (slung over his neck), and with the light which they were enabled to procure from it, the miners travelled through the mines, feeling confident they were safe, and the sparks which the flint would emit would not cause combustion. He would demonstrate how futile such an idea was, for they could ignite a gas jet from the sparks of a flint.—(Mr. Thompson here exhibited the "steel mill;" and, after using it in contact with a piece of flint, succeeded in lighting one of the gas-burners of the lecture-hall.) (Applause.)—The "steel mill" had been abandoned for the safe and valuable invention, Sir Humphrey Davy's lamp. As but little doubt could remain upon the minds of his audience that the quantity of light was in proportion to the number of particles of solid matter rendered incandescent by heat, the lecturer now entered into an explanation of the different qualities of gas employed for illumination. Some kinds were much more illuminative than others, because they contained in a given bulk a larger number of solid particles, or of matter which afforded solid particles, during combustion. In coal gas, the solid generated was carbon, and therefore the larger the amount of carbon in the gas the higher was its illuminative power. But, as carbon is much heavier specifically than the other component of gas—the hydrogen—a very good and ready means of inferring the value of a coal gas was by taking its specific gravity. For this purpose a beautiful little instrument had been contrived by Mr. Wright, of Millbank-street, to whom the art of gas lighting was indebted for many ingenious contrivances. This instrument was a small balloon, like those used by aëronauts, and made to hold exactly 1000 cubical inches. When, therefore, the balloon was filled with any gas lighter than air, it has a disposition to ascend, and the greater this disposition the worse was the gas for illumination. By counterpoising the balloon when filled, it was therefore easy to read off the value of the gas; and Mr. Wright had contrived a set of weights which not only answered the purpose of the gas-maker, but also rendered the indications of the balloon identical with the usual philosophical records, so that the actual scientific specific gravity was thus arrived at. Mr. Thompson here filled the balloon with the gas supplied to the institution, and which is made by the Imperial Company; the results showed the specific gravity of the gas to be ·418, which the lecturer remarked was indicative of very good gas of the common kind. There were other modes of determining the value of gas—by the employment of chlorine and bromine, which were also demonstrated; after which the subject of gas-burners was dwelt upon at considerable length, and their different qualities as regarded "intensity" and "quantity" pointed out. The common fish-tail burner was an "intensity" burner, and suitable for rich gas or cannel gas, whereas the burner in use in that institution (Mr. Leslie's burner) was a "quantity" burner, and therefore well adapted for poor or common gas. The first consumed the gas rapidly, and before many particles of carbon were rendered solid; the last, on the contrary, rendered most of the particles of

carbon solid before they were consumed, and had, therefore, a disposition to produce smoke when neglected or badly managed. As a general conclusion, Mr. Leslie's burner would increase the quantity of light from a common gas flame in the proportion of 13 to 12; but in situations exposed to strong draughts or gusts of wind, it generated much smoke. Other burners were then alluded to, after which the lecturer explained the construction and use of an instrument called a photometer, for measuring the value of light, and proceeded to test the value of that consumed in the lecture-room, which he declared to be equal to at least 13½ spermaceti candles. In conclusion, he regretted that he was unable to refer to other matters which he had intended to do, in consequence of the time appointed to the lecture having expired. (Applause.)

A Graceful Acknowledgment for Public Services.—The *Hanoverian Gazette* of the 15th ult. contains a notification that his Majesty the King of Hanover has been pleased to bestow the Guelphic Order upon G. W. Drory, Esq., of Ghent, the director-general of the Imperial Continental Gas Company of London. Hanover was the first city in Germany in which gas was introduced; and the honourable distinction awarded to the able and energetic chief official of the company is a gratifying proof of the satisfactory manner in which their operations have been conducted in Hanover.

Improved Dwellings for the Labouring Classes.—On Friday a meeting was held in the Guildhall, for the purpose of forming a company under the act of 18th and 19th Vic., cap. 132, for providing improved dwellings for the labouring classes. It is proposed to raise a capital of £1200, in shares of £10 each, to be applied in building 16 dwellings upon land which has been taken in Silver Street, Pockthorpe, and for which plans have been prepared. It is estimated that the rentals of the cottages will (after a deduction of 25 per cent. for outgoings) produce about 6 per cent. on the outlay; but it is intended to limit the profits to be taken to 4 per cent., and the surplus to be applied in such manner as may hereafter be determined on. The promoters of the undertaking are of opinion that the dwellings should be let to needy but respectable families, at such rentals as they now usually pay, whilst the accommodation and comforts which will be afforded will be so superior as always to command tenants. The Mayor presided, and the following gentlemen were appointed a provisional committee:—The Mayor for the time being, the Lord Bayning, Sir Samuel Bignold, M.P.; J. H. Gurney, Esq., M.P.; R. K. Long, Esq.; Charles Evans, Esq.; H. S. Patteson, Esq.; John Barwell, Esq.; Arthur Dalrymple, Esq.; and the Rev. J. Ross; Mr. Robert Cooper, honorary secretary.—*From the Bury Post.*

Southampton.—The experience of the past year having proved that the supply of gas at 5s. per 1000 feet was no longer remunerative, in consequence of the present high price of coals, notice has been given of an advance, to take place from the 1st inst. An attempt has been made to get up an agitation in favour of a consumer's company, which however meets with but slender encouragement. The old company ought, in justice to their shareholders, to have taken this step a year ago, when so many other companies found themselves under the necessity of advancing the price of gas.

Manchester.—At a recent meeting of the town council, Councillor Gill asked the chairman of the water-works committee whether they had endeavoured to alter the rates for trade purposes. He thought the public were satisfied with the 2d. and 6d. rates, but he thought there was great dissatisfaction amongst the payers of the other rate. He believed that every thousand gallons brought into Manchester at the present time cost 6s. per 1000; and while it was sold at 3d. to some consumers, others were charged 1s. 9d. for the same quantity. Sir Elkanah Armitage said he was aware that the charges were not quite equal for trade purposes; but they had received no complaints for the last twelve months. They had no means of altering the graduated scale at present.

The Malvern Gas Works.—This town having had the advantage of good sewers and water-works, which have been carried out by the commissioners under the Improvement Act, nothing was required but gas to complete the trio of modern necessaries, and the want of which has long been felt. The commissioners therefore sought advice for the construction of gas-works, and the whole was entrusted to the hands of Messrs. Charles Walker and Sons, Midland Works, Tipton, Staffordshire, and of Little Sutton Street, London; the buildings and dwelling-houses were undertaken by Mr. G. M'Cann, of Malvern, sublet from Mr. Kerby, of Nottingham. The works are situated on the road from Malvern Link to Barnard's Green, at the end of Fiddler's Pit Lane, and consist of eight clay retorts of the D form, 14 in. by 14 in. and 12 ft. long, open at both ends, and ten iron retorts 5 ft. long; hydraulic main, pipe condenser, scrubber, two dry-lime purifiers 6 ft. square, with six tiers of lime in each; meter to measure the manufacture, gas-holder 48 ft. diameter, 22 ft. 6 in. deep, and will contain 40,000 cubic feet of gas, guided by six cast-iron columns and ornamental girders on top, and a governor to regulate the pressure of gas in the town. The whole of the apparatus is so arranged that any part can be used independent of the other, in case of accident or repairs. The total length of the mains is nearly seven miles, which extend to North Malvern. The works are capable of supplying 56,000 feet of gas per day. The elevation of the town being so much greater than the site of the works, the gas is checked in its flow by valves in the roads. There are to be 100 public lamps. The buildings are of Elizabethan construction, and are very tastefully designed. The 11th of January having been fixed for lighting the town, Messrs. Charles Walker and Sons turned on the gas from the gasholder about mid-day, and as the air was blown out of the pipes by the gas, the inhabitants amused themselves by burning the new light, and seemed much delighted. When night approached, the devices of "V. A." and "N. E." were exhibited, illuminated at the Belle Vue. Mr. Adams, gas-fitter, had a beautiful star; and not content with this, in different parts a ⅜-in. pipe was inserted into the main, and, standing ten or twelve feet high from the road, sent forth great blazes of light. People walked the streets to admire it, and the new light gave great satisfaction for its brilliancy and purity, and is well adapted for private houses. On Friday evening a dinner was given to the workmen engaged in building and fitting up the gas-works, laying the pipes, or anything connected therewith; also those engaged in preparing the bonfire on the hill, not forgetting the men who attended the teams drawing the material for both purposes. The necessary funds were subscribed by the several contractors, inhabitants, and visitors. The dinner was provided by Mr. Davis, of the Belle Vue Hotel, and consisted of substantial joints of various meats (both roast and boiled), plum puddings, tarts, &c., and a bountiful supply of good ale. The tables were laid in the assembly-room, which was decorated and brilliantly lit with gas. About 130 sat down, and others (who of necessity were obliged to remain at the gas-works) were amply provided for. Several ladies were present during the dinner, and appeared much gratified at the proceedings. Mr. Geo. M'Cann presided at the principal table, supported on the right by the Rev. F. Dyson, and on the left by Mr. J. H. Jones, the engineer. Mr. C. C. Walker, of the Tipton Works, was vice-president. Mr. P. Marriott, Mr. G. Edwards, Mr. W. Morrison, Mr. W. Lane, Mr. T. Davis (commissioners), Mr. J. Skey (clerk to the commissioners), the Messrs. Walker, Mr. Braithwaite, Mr. Kerby, Mr. Shipway, and other gentlemen, were present, zealously attending to the wants of the guests. Justice having been done to the good things provided, and the cloth withdrawn, the chairman gave "The Queen," which was drunk with honours. Then followed "Prince Albert and the rest of the Royal Family," "The Bishop and Clergy" (the Rev. F. Dyson returned thanks), "The Army and Navy," "Our brave Allies," "The Town Commissioners," &c. Each toast was prefaced by appropriate remarks, which were much cheered. The Rev. F. Dyson gave "The health of Mr. and Mrs. Davis," eulogising the excellent dinner provided, and wishing them success in their undertakings. Mr. Davis returned thanks in a neat and rather humorous speech. Some good songs were sung, and the company enjoyed themselves till eleven o'clock, when it was announced that "the supplies were stopped," and the company departed in the most orderly manner, evidently much pleased with the good cheer which had been so liberally provided; and it must be admitted that gatherings of this kind have a beneficial effect in convincing mechanics and labourers that, if they conduct themselves in a proper manner, their employers and others will feel an interest in their welfare, and be anxious at proper times to contribute to their wants, comforts, and amusements.

Price Current.

CASTINGS, per Ton.

Average Weight of Cast Iron Gas Pipes, per Yard.

1½ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow	Newcastle.	Wales.	Yorksh., Derbysh., and Staffrdsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1.	4 10 0	3 15 0	4 0 0	4 5 0	4 10 0
1½ and 2 inches Socket Pipes	8 10 0	7 5 0	7 15 0	7 15 0	8 0 0
2½ and 3 do. do.	8 5 0	7 0 0	7 10 0	7 10 0	7 15 0
4 and 5 do. do.	8 0 0	6 15 0	7 5 0	7 5 0	7 10 0
6 inches and upwards do.	7 15 0	6 10 0	7 0 0	7 0 0	7 5 6
Retorts, 1st fusion, hot blast	7 10 0	...	7 10 0	7 10 0	7 10 0
Do. 2nd fusion, cold blast	8 5 0	...	7 15 0	7 15 0	8 0 0
Tank Plates, ¼ thick and above	8 10 0	7 0 0	8 5 0	7 10 0	9 0 0

COALS.

Newcastle.	s. d.		Scotch Cannel.	per ton.
Unscreened.	7 6	per ton.	Boghead ....at Leith	28 0 ,,
Whitwell Primrose	8 0	,,	Kirkness.....best	23 0 ,,
Pelton and Medomsley	8 3	,,	Capeldrae, first quality	20 0 ,,
Pelaw			Ditto, second quality	12 6 ,,
Burnhope, Eighton Moor, New Pelton, Peareth, South Pelaw, Washington Hutton, and South Peareth	8 6	,,	Lesmahago at Glasgow	25 0 ,,
			Ditto at Leith	27 6 ,,
			Arniston	22 0 ,,
Cannel	18 0	,,	Wemyss ...(at the pits)	16 0 ,,
			Knightswood	18 0 ,,
			Methill	11 0 ,,

SUNDRIES.

Best Newcastle fire-bricks, 60s. per 1000		Foreign spelter	£24 per ton.
Ditto ditto clay	12s. per ton.	English block tin	129 ,,
Tough cake copper	£126 ,,	Ditto ditto refined	135 ,,
English pig lead	£25. 10s. to £26 ,,	Banco ditto	132 ,,
Welch bar iron in London,	£9. 10s. ,,	Ground Manganese	£6. 5s. to £6. 15s. ,,

WROUGHT IRON TUBING, subject to 35 per cent. Discount.

	2 inches.	1½ inch.	1¼ inch.	1 inch.	¾ inch.	½ inch.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent welded tubes, from 2 to 12 feet, per foot	1 8	1 0	0 10	0 7	0 5	0 4½
Ditto .... ,, 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting pieces, or long screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, springs, and elbows, wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing sockets, caps, plugs, and nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 0	

FREIGHTS, per Ton.

Coastwise—Newcastle.		*Foreign.*	
Chatham & Roches.	8s. 9d	Boulogne	11s. 6d
Cork	13 0	Barcelona	34 0
Dover	9 3	Bordeaux	22 0
Dublin	14 0	Cadiz	17 6
Exeter Quay	11 3	Calais	11 6
Folkestone	9 0	Dieppe	14 6
Hastings	10 6	Genoa	34 0
London	8 9	Hamburg	13 0
Lowestoft & Yarmth	6 6	Havre	14 0
Lynn	8 0	Leghorn	33 6
Portsmouth	11 0	Lisbon	21 0
Plymouth	12 0	Rotterdam	13 0
Whitstable	9 6	Stettin	16 6
Weymouth	10 0	Trieste and Venice	30 6

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PURIFIED COKE.—The attention of Gas Companies is requested to the advantages of Purifying their Coke, as a means of increasing its commercial value and its facility for sale. For information, apply to Mr. G. TRICKETT, Metal Agent, 58, Spring Gardens, MANCHESTER.

TO be Disposed of, a Second-hand CONDENSER, consisting of 14 Vertical 6-in. Pipes, each 14 feet long, connected at top by H-pipes and Blank Flanges. Bottom box of cast iron, with proper Division-plates. Three 4-in. Valves and 4-in. Bye-pass. Also, a SMALL BOILER, that has been in use a few months—as good as new—12 ft. 6 in. long, 3 ft. 6 in. diameter, made of 7-16 plate, with elliptical ends. For particulars, apply to Mr. PENNY, Engineer, Wenlock Iron Works, Wharf Road, CITY ROAD.

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(Established 1830),

Begs respectfully to call the attention of Gas Companies, Engineers, &c., to his WET GAS METER, made upon the most improved principles, the most admirable materials, and warranted to register correctly

MR. HENRY GORE,
CIVIL AND CONSULTING GAS ENGINEER.
OFFICE,
25, YORK PLACE, LEEDS.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas Works and Water Works.

Warehouse in London for Cast-iron Pipes and Connections of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Office in London, Mr. E. M. PERKINS, 67, Mark-lane.

WILLIAM RICHARDSON & CO.,
ENGINEERS, IRONFOUNDERS,
AND
CONTRACTORS
for the Erection, Enlargement, and Repair of
GAS & WATER WORKS,
No. 84, CHARLES-STREET, CITY-ROAD,
LONDON.
WORKS:
Tunnel Foundry and Iron Works, DUDLEY.

ANDERSON'S
DOUBLE-ACTING PISTON EXHAUSTER
is the most simple and effective machine of the kind made. It gives no appreciable oscillation or slip; works with extremely little friction; and requires no internal lubrication.

These Exhausters are in operation both in London and the Provinces, pumping from 10,000 to 70,000 cubic feet of gas per hour. They occupy very little space, and may be set either perpendicular or horizontal.

Particulars of price, &c., may be had on application to Mr. ANDERSON, at the Gas Works, Rotherhithe LONDON.

TO GAS COMPANIES, ENGINEERS, AND MERCHANTS.

EDWIN DIXON,
WROUGHT-IRON TUBE WORKS,
WOLVERHAMPTON,

begs with the utmost confidence to solicit the order of Gas Companies, and persons using or selling Gas Tubes. Having for a long period supplied the largest Gas Companies and Consumers in the United Kingdom and the Continent with unvarying approbation, and almost exclusively the Local Boards of Health under Government Engineers, with Galvanised Iron Tubes and Connections, it has become an inducement to make such facts known.

Large Stock always being on hand, orders of any magnitude, from 10 to 100,000 feet, are executed promptly, and carefully tested by powerful hydraulic pressure before leaving the Works.

Boiler Tubes, Core Bars, Hollow Spindles, and Hydraulic Press Pipes, to resist 5000 lb. to the square inch, made on the shortest notice.

The only Prize Medal of the Great Exhibition, 1851, awarded.

WALTER MABON,
ENGINEER.
ARDWICK IRON WORKS, FAIRFIELD STREET,
MANCHESTER,
Manufacturer of

IRON TANKS for Gasholders, Railway Stations, &c.

GASHOLDERS.—Extensive premises at Gorton, solely for the manufacture of Gasholders, and other heavy Wrought-Iron Structures.

GAS APPARATUS.—W. M. has an extensive assortment of patterns for Purifiers from 4 feet to 15 feet square, also round ones from 4 feet to 10 feet diameter; Scrubbers, Condensers, Washers, Columns, Girders, and Tripod Patterns, suitable for Gasholders, from 10 feet to 150 feet diameter, either Single-lift or Telescope. Contractor for Gas Works of any Magnitude. Designs, Specifications, and Estimates furnished.

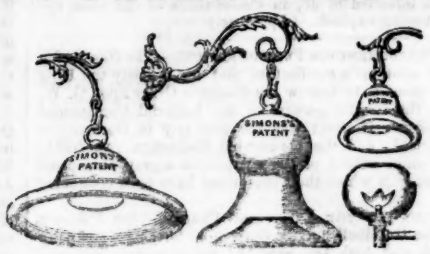
WROUGHT and CAST IRON ROOFS for Railway Stations, Gas Works, Warehouses, and Sheds, prepared for Slates or for Corrugated Iron.

IRON HOUSES, either for Dwellings, Manufactories, or Public Buildings.

PIPES and VALVES, for Gas and Water, from 2 inches to 48 inches bore.

(BY HER MAJESTY'S ROYAL LETTERS PATENT.)

SIMONS'S PATENT PERDIFUME,



OR

GAS-SMOKE CONDENSER.

This invention is submitted to the Public as the perfection of a Gas Shade. It both condenses the smoke and absorbs the noxious vapours arising from the combustion of Gas or other illuminating agents. It thus preserves the colour of the ceiling unimpaired, and maintains the air of the room in a state fit for respiration. In ill-ventilated Rooms it is especially useful, for it withdraws the carbonic acid (produced by combustion) from the air, and prevents the headache and depression which so commonly arise from an accumulation of noxious vapour in small rooms lighted by Gas.

In Rooms sufficiently ventilated, this invention arrests the imperfectly consumed carbon, which, escaping from the flame, deposits itself on all the most delicate articles in the room, tarnishing and discolouring them.

It is hence an ever corrective of imperfect combustion or defective ventilation, immediately coming into operation when either of these evils occur; it is simple in construction, and the first cost is small. It is free from all complication, and may be safely left to the care of Servants; its current cost of working is very trifling, there being nothing more required to be used in the Condenser than a small quantity of SODA, LIME, or POTASH.

Price—in Glass, 2s. 6d. to 5s. each; Metal, 5s. each.

To be had at the Establishment, 84, DALE END, BIRMINGHAM, where they may be seen constantly in use, and at most Ironmongery and Glass Warehouses.

By Her Majesty's Royal Letters Patent.

JOSEPH BOULTON,
PATENT DRY GAS-METER MANUFACTURER, and also Maker of his Improved WATER METERS
No. 28, BAGNIGGE-WELLS-ROAD, CLERKENWELL, adjoining the Police Office.—Late of No. 1, Coppice-row, LONDON.

Experimental and Station Meters of any size made to order on the shortest notice.—Governors, Pressure Registers, Gas-cooking Stoves, and every description of Gas Apparatus.

WILLIAM PARKINSON & CO.
(*Successors to the late Samuel Crosley*),
COTTAGE-LANE, CITY-ROAD, LONDON,

Beg most respectfully to announce that, in addition to the continued manufacture of GAS METERS, they manufacture Meters for measuring Water, Spirits, &c. (commenced under Patent, in 1849, by the late Mr. William Parkinson).

N.B. These Meters are as simple and durable as the Gas Meter, and as correct as that instrument under the most careful manipulation.

WEST and GREGSON,
GAS-METER MANUFACTURERS, &c.
UNION-STREET, OLDHAM.

Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.

W. and G. would respectfully call the attention of Gas Engineers and Managers to their Station-meters, having made and erected the largest in use at the present time, two of which may be seen at the Stockport and Liverpool Gas Works, on application to the respective Engineers; also to the Paris Universal Exhibition. Class IV., Section 1., No. 269.

TO GAS COMPANIES, FITTERS, AND IRONMONGERS.

LLOYD and SUMMERFIELD,
Manufacturers of CUT and FLINT GLASS Jet Moons, Globes, Hemispheres, and Chimneys of every description; Hall Lamps, Lustres, and Chandeliers of the most modern patterns.
PARK GLASS WORKS, BIRMINGHAM.

JAMES OAKES and CO.,
ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, CITY ROAD,
LONDON,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including best cold-blast iron Retorts, Socket and Flange Pipes of all sizes, Bends, Branches, Syphons, &c.; also Lamp Columns of different patterns.

London Agent, Mr. ALFRED PENNY, Engineer, WENLOCK IRON WORKS, Wharf-road, CITY-ROAD, who undertakes the manufacture and erection of gasholders, purifiers, iron roofs, and every description of apparatus in use in gas works.

THOMAS EDINGTON,
PURCHASER AND INSPECTOR OF CASTINGS ON COMMISSION.
17, GORDON STREET,
GLASGOW.

TO GAS COMPANIES.

NEW PELTON MAIN GAS COAL.
Parties wanting a supply of these first-class GAS COALS, which are extensively used in the London and other gas works, will please to apply to Mr. JAMES JOICEY, Newcastle-upon-Tyne.

FOR £20, an Excellent Dry Gaso- METER, in good condition; will contain 1005 feet of gas. Cost £50, and has had two years' wear. Address Y. H. and Co., Effingham Works, ROTHERHAM.

PATENT SELF-ACTING TUBE CUTTER.

BLEWS & SONS, sole licensees and makers of the PATENT SELF-ACTING TUBE CUTTER, beg to call the attention of gas companies and others to this valuable machine, which is intended to supersede the hitherto tedious and expensive way of cutting tubes, &c., with the file, and by means of which the largest wrought-iron gas or steam tube may be cut through with ease in a few minutes. The apparatus is easily fixed and adjusted to any size tube, is not liable to be disarranged, and will be found most useful for gas engineers, companies, fitters, &c. For drawings, testimonials, and prices, apply to the makers, enclosing two stamps.

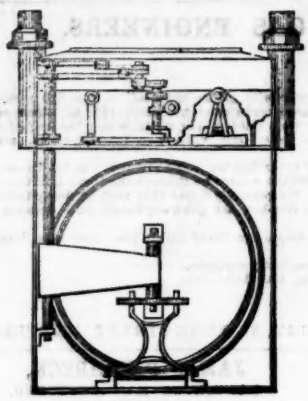
GAS JETS.—TO CONSUMERS OF GAS.

WILLIAM BLEWS AND SONS have, by their improved machinery, succeeded in making GAS JETS of a description superior to any hitherto made; they burn less than the usual quantity of gas, yet produce a body of light greater in power than the ordinary Jet. Each Jet is guaranteed as proved, and warranted to burn the exact number of feet per hour marked upon it, under the given pressure. Gas Companies may thus know the average consumption of street lamps without meters. One dozen forwarded as samples on receipt of twelve postage stamps. Bartholomew Street Works, BIRMINGHAM.

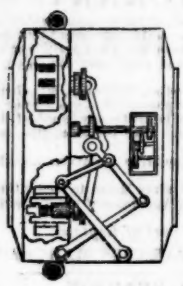
TO GAS COMPANIES.

R. LAIDLAW and SON, Gas ENGINEERS and FOUNDERS, Edinburgh and Glasgow, respectfully intimate, that on and after the 1st of January they will be represented in London by Mr. ROBERT DAVISON, Member of the Institution of Civil Engineers, who will be happy to attend to all local and foreign business. R. L. and SON manufacture, on a very extensive scale, GAS APPARATUS of every description, viz.: CAST-IRON RETORTS, HYDRAULIC MAINS, CONDENSERS, SCRUBBERS, PURIFIERS, HYDRAULIC and improved SLIDE-VALVES, STATION METERS (of superior designs), from the smallest size to 12 feet square; GASOMETERS, GOVERNORS, PRESSURE INDICATORS, CAST-IRON PIPES, WROUGHT-IRON and BLOCK-TIN TUBES, LAMP-POSTS in great variety, CONSUMERS' METERS, and every other Article required in the Manufacture and Distribution of Gas.

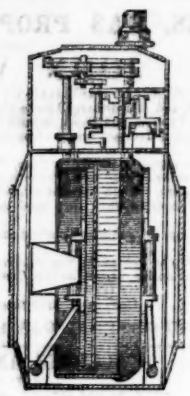
OFFICES: 8, London Street, City.



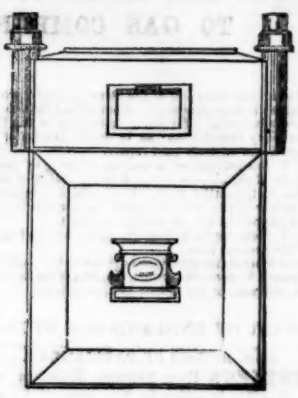
ELEVATION, with Front removed and Valve-box broken.



PLAN. Valve-box broken away to show Valves.



SECTIONAL ELEVATION.



FRONT VIEW.

W. J. WARNER'S PATENT DRY GAS METER.

THOMAS EDGE

begs to inform Gas Companies and Consumers that he has become the Proprietor of the above Patent; and that, having made arrangements for the Manufacture of the same on an extensive scale, he is prepared to supply all sizes in any quantities.

The advantages of this Meter have been recognised by the highest authorities, and those who have tested and used them.

The most obvious improvements are—

1. The movements of the Valve Cover at its base, so that no deposition on the face of the Valve can cause the Cover to tilt, and thus allow the Gas to pass without registering.
2. The protection of the whole of the Machinery in the upper chamber from the action of the Gas, which has never before been accomplished.
3. Greater simplicity, and a less amount of flexible material in the Diaphragms than in any other make.

These Meters, and also the Patent Lever Valve Wet Meters can have either the Common Index or Patent Indicator attached; and are manufactured, with Station Meters, Governors, Pressure Registers, Gauges, Gas Fittings, and every description of Gas Apparatus, at the Works, Great Peter-street, WESTMINSTER.

CITY OFFICE, and Depôt for Meters, Pipe Barrel, and Fittings, 9, WALBROOK, Mansion-house.

FIRE-CLAY RETORTS.

JOHN SWARBRICK,

MANUFACTURER OF PATENT COMPOSITION CLAY RETORTS,

FIRE BRICKS OF EVERY DESCRIPTION, SHAPE, AND SIZE, &c. &c.

HIGHER EANAM, BLACKBURN, LANCASHIRE.

These RETORTS are generally used in the Gas-works of Preston, Accrington, Bury, Heywood, Middleton, Rochdale, Ratcliffe; the Mills of Messrs. Horrocks, Miller, and Co., Preston, &c. &c., and are unequalled in having afforded general satisfaction to those who have given these Retorts a trial.

To meet the increasing demand, the Works at Little Harwood have been greatly enlarged; and Gas Engineers who may favour with an Order may rely with confidence on their being promptly supplied with an article not to be surpassed in finish or durability.

PRICES MODERATE.

ALEXANDER WRIGHT,

GAS ENGINEER, MANUFACTURER OF GAS METERS, GOVERNORS,

AND ALL DESCRIPTION OF GAS APPARATUS,

55, MILLBANK STREET, WESTMINSTER.

CONSUMERS' METERS at the List Price, with a Liberal Discount to Wholesale Purchasers.

NEW INSTRUMENTS FOR THE USE OF GAS COMPANIES.

THOMPSON'S BROMINE TEST.

Apparatus, including Graduated Tube and Equalising Cylinder, £1. 1s.

Bromine, 3s. per ounce.

AN APPARATUS for TESTING the PRESENCE of BISULPHURET of CARBON in GAS.

Cost of Apparatus, £2. 2s.

AN APPARATUS FOR DETERMINING

THE HEATING POWER OF SAMPLES OF COAL and OTHER DESCRIPTIONS OF FUEL,

INVENTED BY LEWIS THOMPSON, ESQ., M.R.C.S.,

Complete Apparatus, in Polished Mahogany Travelling Case . . £5 5 0
In ordinary Packing Case 3 3 0

WITH INSTRUCTIONS FOR THE EXPERIMENT.

A REGISTERING PRESSURE GAUGE.

It is important to Gas Companies to know the pressure at various parts of their districts during the successive hours of the night, for the better regulation of their initial pressure at the Works. This compact apparatus, capable of being placed in a space of about one foot cube, is intended to supply this information.

Net Price, £8. Glass Shade, 10s. extra.

STATION METERS, PRESSURE GAUGES, PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, &C.

TO GAS COMPANIES, GAS PROPRIETORS, AND GAS ENGINEERS.

JOHN VICKARY

begs to call the attention of the above to his improved METALLIC CASE GAS-METER, an improvement which has met with entire approbation from the various Gas Companies and Engineers to whom he has introduced it, and acknowledged to be the greatest improvement that has been made since the year 1832; at which period a metal was introduced for the construction of the Drum, Syphon, and Float, capable of resisting any impurities arising from either gas or water, which has been found to answer every expectation; as, in repair, Drums of the above date are found in perfect and good condition, when the Outer Case, Valve-box, Inlet-pipe, &c., are quite destroyed and entirely past repair.

J. V. has introduced a coating or lining of the above metal in the Outer Case, Valve-box, Inlet-pipe, &c., thereby rendering the whole as durable as the Drum, as not a particle of tin plate is exposed to the action of either water or gas; and preventing the possibility of gas passing above the water line through the front into the body of the Case to the outlet unregistered, which frequently occurs. When the Meter has been in use for any length of time it is generally found that rust or decay takes place *above* rather than under the water line, which is only discovered when they need repair. Also the Inlet-pipe and Valve-box are generally found quite decayed, which cannot happen in the above improvement.

J. V. feels confident that the above will be found a most desirable and perfect instrument, as it contains all other improvements of utility that have been introduced up to the present time.

The most strict attention is given to the workmanship as well as the registration of every Meter, to render them perfectly accurate.

Station Meters, Governors, &c., made on the shortest notice, as well as Gas Cooking Apparatus of every description, Gas Baths, &c.

Meters sent at the lowest London prices.

Carriage paid to any part of England.

WEST OF ENGLAND GAS METER AND GENERAL GAS APPARATUS MANUFACTORY, 84, FORE STREET, EXETER.

NEW HOUSES OF PARLIAMENT.

DEFRIES'S Gas Stoves, Ranges, and BATHS, in action for two years at the above building. A great variety in stock upon the same principle. Gas Baths from £7, by which a warm bath may be obtained for 1½d. Gas Cooking and Heating Stoves, from £1. Defries's celebrated Dry Gas Meters —upwards of 60,000 in use.

Testimonials at the Office, 145, REGENT-STREET, or at the Manufactory, NEW-ROAD, St. Pancras, near Fitzroy-square.

HARRIS AND PEARSON,

PROPRIETORS OF

BEST CLASS-HOUSE POT AND CRUCIBLE CLAY.

MANUFACTURERS OF

FIRE BRICKS, GAS RETORTS, &C.

AMBLECOTE FIRE CLAY AND BRICK WORKS,

STOURBRIDGE.

Late in the occupation of I. and W. King.

Originally J. Pidcock, Esq.

JAMES PINCHBECK,

GAS METER MANUFACTURER,

26, CAMDEN-STREET, and 9, PIERREPOINT-ROW,

ISLINGTON, LONDON.

Begs respectfully to announce to Gas Companies and Fitters, that from upwards of 20 years' practical experience, he is enabled to supply a METER combining correctness, durability, and economy.

N.B.—Repairs on the lowest scale.

JOSEPH CLIFF,

WORTLEY FIRE-BRICK WORKS, near LEEDS.

FIRE-CLAY RETORTS, OF ANY SIZE OR SHAPE, SUPPLIED ON SHORTEST NOTICE.

These Retorts are used extensively in the Gas Works of Leeds, Hull, Liverpool, Bradford, Rochdale, and other towns, where they have been tested side by side with those of Stourbridge, Newcastle, and other makes, and proved themselves a superior article.

Eminent Gas Engineers bear testimony that they are the BEST FINISHED AND MOST CORRECT IN FORM of any in the kingdom. Their surfaces are, by the peculiar method of their manufacture, unusually smooth, close, and FREE FROM SURFACE CRACKS; thus, in a great measure, preventing leakage and the adhesion of carbon to their interior surfaces.

To meet the great increase in demand, extensive enlargement of premises and the fitting up of more perfect apparatus have been effected; and gas engineers may rely with confidence on their orders, to any extent, being promptly and satisfactorily executed.

N.B.—FIRE BRICKS, TILES, AND OTHER FIRE GOODS, OF UNEQUALLED QUALITY.

CAST-IRON Retorts, Socket Pipes, with Syphons and all requisite Connections, Lamp Columns, Wrought Iron Tubing, Valves, Street Lamps, Sight Holes, Furnace Doors, Ash Pans, Charging and Coke Shovels, Iron Pails and Coke Barrows, Cross Bars, Fire Pots, Pumps, Iron Borings.

PURIFIERS, CONDENSERS, and SCRUBBERS erected complete, or the materials supplied; with every description of goods in use by Gas Works, in stock, on wholesale prices, at

LYNCH WHITE'S,

Old Barge Iron Wharf, Upper Ground-street,

LONDON.

GAS EXPLOSIONS Prevented by using the Tubes and Fittings Manufactured by JOHN RUSSELL and CO.,

whose Goods are all well Tested and Warranted.

The first manufacturers of Lapwelded Flues for Locomotive and Marine Boilers.

The FIRST PRIZE of the Paris Great Exhibition was awarded to them for Gas Tubes and Fittings, and Tubes for Marine and Locomotive Boilers.

John Russell and Co. are the Original Manufacturers, and at present the Holders, of the Patent for Tubes.

WAREHOUSES,

69, UPPER THAMES STREET, LONDON.

MANUFACTORY,

THE OLD TUBE WORKS, CHURCH HILL, WEDNESBURY, STAFFORDSHIRE.

BRYAN DONKIN and CO.'s improved GAS VALVES have been adopted by numerous Gas Companies in England and abroad, and their advantages and great security fully proved. Very large numbers are in use. Prices from 11s. to 14s. per inch diameter.

BRYAN DONKIN and Co.,

Engineers, near Grange-road, BERMONDSEY.

GAS MANUFACTURE.

GEORGE BOWER, Vulcan Foundry, ST. NEOT'S, HUNTS, will be glad to prepare Plans, Specifications, and Tenders, for the lighting of Towns, Manufactories, and Private Houses with Gas.

References can be given to both private and public works.

His Patent Combined Apparatus, which forms the Hydraulic Main, Condenser, Scrubber, and Purifier, in one vessel, is especially adapted for works up to 500 lights.

His patent ridged, or rib-bottomed retort is applicable to works of any magnitude, the object of which is to carbonise more rapidly than by the ordinary flat-bottomed retort.

Manufacturer of Gasholders, Gas Meters, Gas Cooking and Heating Stoves, and all Apparatus connected with Gas-Lighting.

N.B.—The Combined Apparatus and Retorts will be sold separately, if required.

H. JONES, Gas Meter Manufacturer, No. 44, OLD-STREET, St. Luke's, London, begs respectfully to call the attention of Gas Companies yto his latest improvements in the WET METER, b means of which water cannot be abstracted, neither can Gas by any possibility pass through the Meter without registering.

PATENT GAS METER MANUFACTORY,

No. 66, Snow-hill, London.

WILLIAM SMITH, by the improvements he has made in the Wet Meter, and which he has secured by her Majesty's Royal Letters Patent, the accuracy of their registry is rendered certain by the introduction of the adjusting slide and hydraulic, whereby a Perfect Water Level is readily obtained, and the Hydraulic precludes the possibility of abstracting water from the meter by increased pressure or otherwise, thus surmounting the great desideratum of the Wet Meter. In his Patent Equitable Gas Meter neatness and strength are combined, the backs and fronts of the case being stamped by powerful machinery out of thick plate iron (tinned or galvanized); and the internal construction is of the best metal, which will resist the action of any impurity in the gas.

Old Meters may readily have the adjusting slide and hydraulic applied, thereby having accurate measurement assured.

Station Meters, Governors, &c., made on the shortest notice.

HULETT AND CO., 55 AND 56, HIGH HOLBORN,

PATENTEES and MANUFACTURERS of the NATIONAL GAS METER,

Beg to inform the Proprietors of Gas Companies, and the Trade generally, that, having completed their new Gas Meter Manufactory, they are now enabled to supply, with despatch, a very superior article, and can confidently warrant the same to be equal in quality and workmanship to any Gas Meter ever made. Manufacturers of

GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, PILLARS, BRACKETS, PENDANTS,

AND EVERY ARTICLE CONNECTED WITH

GAS FITTINGS.

GAS COOKING APPARATUS, IMPROVED ALBERT,

AND EVERY DESCRIPTION OF

SHADOWLESS GAS BURNERS, UNION JETS, BATSWINGS, &c. &c.; CAST AND WROUGHT IRON PIPE; COPPER, TIN, BRASS, and COMPOSITION TUBING.

D. HULETT'S IMPROVED SERVICE CLEANSER,

by which Mains, Service Pipes, and the interior Fittings of a House, may be cleaned out in a few minutes. Price 60s. net.

Sole Manufacturers of Church and Mann's Improved Photometer.

Large Pattern Books, with every description of Gas Fittings and Chandeliers, &c., with complete Book of Prices, price 10s.

Price Lists sent free, on receipt of envelope, addressed and enclosing two postage stamps.

London: Printed by THOMAS GREAVES BARLOW, of 3, Parliament Street, in the parish of St. Margaret, Westminster (at the office of Joseph Clayton, 10, Crane Court, Fleet Street); and published by him at 58, Cheapside, in the parish of St. Mary Cole, in the City of London.—Tuesday, January 22, 1856.